The Missing Link: A critical perspective on the role of Heads of Department in relation to Information Communications Technology and UK Secondary Schools.

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Abstract

Since its inception in the 1980s digital technology is considered to be at the heart of contemporary education in the developed world, supported by national ICT strategies and exponentially rising levels of public funding. Yet the promised educational transformation, as measured by learning outcomes, has arguably failed to materialise, while developing countries continue to emulate unproven digital educational programmes. A substantial body of empirical research, conducted by policy makers, business and educators over the past forty years has found tangible beneficial evidence consistently elusive.

This qualitative-based study seeks to explain the dichotomy by critically investigating what is actually happening when digital technology meets education in UK secondary schools as opposed to what is often envisaged as 'should' or 'might' be happening. It moves the debate beyond both its learning focus pre-dominance, and deterministic view of education and technology to one which addresses the educational phenomenon by reference to the broader context of the social, political, historical and cultural conditions that influence all educational practices and which recognises the mutual social-shaping nature of the relationship.

Consequently, this qualitative study utilises semi-structured interviews in a multi-level framework to explore how secondary school heads of department; a hitherto under-researched group, at the organisation's structural intersection, have responded to the introduction of ICT from the 1980s to the current day.

This thesis contributes to the advancement of knowledge and understanding by drawing attention to issues of continuity and change, and structure and agency within the educational process and by offering insights into why (unforeseen) developments have occurred, how they have evolved and with what consequences for the profession and its educational institutions. It concludes by establishing a link between ICT-induced structural developments and agency constraints, offering policy makers a means of addressing key detrimental oganisational procedures in order to improve educational processes.

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Chapter 1

Introduction

Rationale for the research

This thesis is the outcome of reflection on three persistent questions which have perplexed me during a thirty year career in secondary education as both teacher and researcher. Primarily, why, has a centrally driven, highly expensive technological initiative in education, accompanied by a substantial increase in the physical presence of technology in schools, flourished for three decades in the light of all apparent rational evidence against it? Namely, the 'failure' to produce the much-heralded technology-led 'transformation' of the practices of education and, employing the government's own criteria, to improve economic growth and educational attainment as measured through testing. Secondly, why after apparent extensive investigation into this dichotomy throughout the developed world do the reasons for the apparent inability of Information Communications Technology (ICT) to transform teaching and learning as anticipated still remain unclear? Thirdly, why have the significant, complex and often divisive effects of ICT, within teaching, learning, the profession and the whole school organisation, of which, as a practitioner, I am cognisant, (comparable to those of a similarly 'technologically led' revolution of the 19th Century) remained unacknowledged and unexplored. It is by seeking to remedy the gap in knowledge and understanding of the latter question that an understanding of two former and inter-linked questions will also be addressed by this research.

Answers to these questions are of value to the developed world in order to better inform educational technology policy and its publicly accountable expenditure (of which ICT absorbs high levels irrespective of economic climate), to the developing world which is currently in the process of allocating scarce resources to replicate unproven and possibly wasteful initiatives, and for both in order to raise awareness of, and to address the social costs engendered by flawed policies on the lives of those participants directly involved; namely the current and future generations of teachers and students.

Technologies investigated

Of course what is actually meant by ICT and educational technology in my study requires clarification of itself. Understandings of 'educational technology' (as both a field of study and a concept) are varied and constantly evolving. The orthodox definition of the latter from the Committee for the Association of Educational Communications and Technology is one that posits the 'study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources' (Januszewski & Molenda 2007).   The former (Information and Communications Technology or Technologies) is a composite term that usually includes any communication device or application, encompassing radio, television, cellular phones, computer and network hardware and software, satellite systems and the services and applications associated with them. Whilst my investigation focuses on the applications of contemporary 'technology' in its non-analogue (data measured as a continuously varying value), digital format (discontinuous data processed in binary zeroes and ones) to 'education', the former includes a definition beyond that of mere technological devices and applications to the processes and practices surrounding them. Thus their meanings for individuals and the social relations and structures to which they are attached, are primary considerations.

Similarly, the 'education' aspect is understood as more than learning (individual skills and knowledge acquisition) per se, but includes pedagogy and the conditions and arrangements whereby learning takes place; the immediate social milieu of organizational cultures and the wider contexts of commercial, national and global environment. Thus technological artefacts, activities and practices are interlinked with context throughout my investigation.

However, the language used to denote such recent technologies is temporary; unsurprisingly so by virtue of its rapid development, particularly the convergence of computer and communications technologies (e.g. internet based technologies), an era through which many participants lived and worked. Consequently, although a wide variety of labels, linked to the chronological innovations of computer-based systems (used to produce, manipulate, store and communicate information) will be applied by myself and the participants interviewed (related to the time period in which a particular technology was being employed), they can be considered interchangeably. The varied terminology

deployed in this study is thus that used specifically by the participants themselves, and by academic scholars in the literature reviewed. In illustration, the technical aspects of 'Information Technology' (IT), 'Information and Communications Technology', 'computerised technology', 'digital technology', 'e-learning', 'social media' and institutional technology can all be viewed under the umbrella term of 'educational technology' when they are conjoined with the social world of education. (**Appendix 1** illustrates the educational technologies referenced in the research in more detail).   Thus 'educational technology' in my thesis will refer to any digital technology employed in an educational context; for the purposes of teaching, administration and management within the domestic or workplace environment.

Context & Background

Preliminary reading of the literature incorporating an historical perspective clarifies the dichotomy in cause and effect posed by my questions to some extent and highlights a number of limitations from which knowledge and understanding of the relationship between technology and education has suffered and which this thesis seeks to address.

Firstly, the subject has rarely been approached in an holistic or historic manner which would enable a comprehensive understanding and assessment of educational technology within its broader economic, cultural and political context and in particular the manner and reception of initial delivery. For example, an appreciation of the crucial political dimension of the subject has often been neglected. The initial imperative for the application of technology to educational settings in the early 1980s (and reinforced in the re-forged consensus of the 1990s) was arguably not 'internally' driven by a perceived capacity for improving education for the better, based on rigorous pedagogical evidence within the educational and academic community itself, but was 'externally' driven by government for political and economic reasons and consequently measured in (e.g. Gross Domestic Productive growth) non educational terms (Robins & Webster 1989). At a macro level, therefore, and without consultation with the teaching profession or referencing any critical research based on learning with ICT, politicians used educational policy to address issues of relative national economic decline based on an analysis which attributed key elements in that

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decline to a societal transition from a 'Fordist' through a 'post-industrial', (Bell 1973) to a fully fledged globally based 'information network society' (Castells 2010), whereby the importance of the production, transmission and consumption of information and knowledge, had replaced traditional manufacturing and goods production.

Since prevailing economic opinion also attributed the new computer-information processing telecommunications convergence as largely responsible for this revolution, politicians articulated the view that the secret of future productivity and global prosperity was to develop a versatile, knowledge creative and technologically innovative workforce as the driving engine of future economic growth, exemplified via the Conservative's educational reform legislation (1979-90) and New Labour's 'The Learning Age' (DfEE 1998). Although a 'labourist', 'human capital' justification for publicly funded state education has a long heritage, it had never been welded before as the central instrument in what was usually a much broader repertoire of governmental social and economic policies. Labour Premier Callaghan's 1976 Ruskin College speech initiated the first of a series of such policies (based on an assessment of national economic policy emasculation in the face of globalism), which were extended though the Trade and Industry funded educational technology policies of (Conservative) Thatcher and culminated in the 'Blairite' technological drive as articulated in New Labour's 1997 pre-election, 'Education, Education, Education' mantra. However, since the reasons for economic 'decline' (or the British disease) were manifestly more politically, socially and economically complex and, due to globalisation, arguably outside the nation state's remit to address, educational policy could hardly 'fix' them and educational success as measured in economic growth terms was unsurprisingly doomed to 'failure'.

A highly directive, aggressively monitored and statutory-enforced manner of delivery of educational technology, however, has demonstrably influenced its reception, perception and implementation in secondary schools by teachers at both the 'meso' (school organisational) and 'micro' (personal and classroom) levels of implementation. However, the manifold influence of such technology on both the teaching profession itself; demoralising, de-professionalising, accentuating or diminishing changes initiated by an ideological agenda (which arguably sought the elimination of local government and trade unions' role in educational policy making) and on a traditionally hierarchically structured school

organisation (facilitating greater centralised surveillance and monitoring) situated within a newly developing blame-deflecting culture, has also received little investigation.

Secondly, this field has suffered from a lack of enlightening robust empirical evidence on which to base an understanding of technology and education due to its long-held adherence to deterministic thinking. This approach which attributes technologies with the possession of inherent qualities capable of predictable 'impacts' or 'effects' on learners, teachers and educational institutions, if used 'correctly', has arguably encouraged misleading assumptions and led to dubious analyses and the drawing of simplistic conclusions, often recommending the overcoming of barriers or 'impediments' within the educational context, so that the inherently beneficial effects of technology can be experienced (Selwyn 2011a). That technology effectively determines social change, and in its 'hard' form is the only factor in social change, has led to an exclusion in such research of other forms of social agency in the implementation and use of technology, rendering teachers and students in a mere responsive position to the technologies with which they are presented.

This view also fails to acknowledge the realities of technology use in educational contexts, which as a practising teacher I recognise to be complex, unpredictable and certainly not inevitable or consistent (Fullan 2007), as this thesis reveals. Personal observation and exploratory interviews with teachers, for example, suggests that ICT use does not necessarily produce the much promised positive learning skills (creativity, critical thinking and problem solving) but may foster negative ones (plagiarism, an emphasis on presentation over substance, the promotion of lower level thinking skills and academic 'laziness') and uncritical information handling skills, as reflected in my own MSc research (Barker 1999). For these secondary teachers, new technologies coupled with external political and social changes and pressures (league tables, assessment, appraisal) have transformed their role in an unpredicted manner from one where teaching, once central, becomes secondary to the new ICT facilitated roles of administrator, cleric, (report writing, registering, monitoring, data input) publisher, (software creator and portal developer) marketer, (website presence, publishing) and analyst (via Schools Information Systems), previously the provenance of senior management. In addition, the much-heralded ICT driven democratisation of organizational structure has failed to materialise and has arguably been reversed;

actually reinforcing hierarchical and stress-inducing surveillance style structures.

The same flawed externalist logic of treating new technologies as autonomous forces which compel society to change (Nye 2007) has been responsible for manifold, continually updated strategies (e.g. ICT-embedded National Curriculum, the National Grid for Learning, UK Net Year programmes 1997, Learning & Technology Centres, New Opportunities Fund, the British Educational and Communications Technology Agency, National College For School Leadership, 'ICT in Schools', 'Laptops for teachers', 'Curriculum online', 'Testbed Project' etc.) based on the false proposition that a workforce could be revolutionised and transformed by means of the physical presence of technology alone. A view which has also dominated much of the positivistic and narrowly focused (hardware and learners), quantitative research methodology utilised to explore and explain its 'failure'. Consequently, many investigations and quasi-experimental international studies conducted throughout the 2000s (USA, Israel, Germany, Netherlands), utilising simple explanatory 'cause' and 'effect' methods (usually hardware and student achievement as measured by test score correlation) in isolation of full historical, political, economic and social context, have produced findings which are, Selwyn (2011a) suggests, misleading, universally inconclusive (Angrist & Lavy 2002; Hepp et al. 2004), productive of negative correlations (Tolani-Brown 2009), subject to claims and counter claims (Fuchs & Woessman 2004; Blackmore et al. 2003), uniformed conjecture and 'nuero-myth' (Schultz 2009).

Such research by initially omitting the mediating role of teachers in the delivery of the learning process and based on causal correlations between two variables is far too limited, I believe, to elicit meaningful findings in a phenomenon as complex as education. One which occurs within a wider context of social conditions, arrangements and social relations and is influenced by numerous social, cultural, economic and political variables which are very difficult to isolate and measure objectively. Thus, the application of quantitative techniques and statistical data is inadequate and inconclusive in terms of understanding the processes that are occurring in schools, or their meaning for either teachers or students.

A high proportion of research findings have also suffered from the political bias inherent in extensive contract-based investigations. A lack of independence and limited focus is reflected in the (now redundant) British Educational

Communications and Technology Agency's studies (BECTA) under commission from the Department for Education and Skills (DfES) utilising quantitative techniques to specifically infer positive findings based on a range of simple correlation tests which assessed input variables such as pupil:computer ratios, broadband, laptops against outputs/impacts measured as national test scores for 11 and 14 year olds and GCSE students (Harrison et al. 2002; Somekh et al. 2002). Although some economists, since Angrist and Lavy's 2002 study have sought to apply more rigorous economic instruments to the task, as the title of Machin's (2007) research suggests, ('New technologies in schools: Is there a pay off?') the purpose of such investigations often remains restrictive in terms of being overtly designed to facilitate governmental economic decision making.

Thirdly, the field has been affected by a lack of non-neutral public debate which divorces realities from subjective rhetoric, as articulated and propagated by government, the media, business leaders and the ICT industry, all of which has generated an 'unquestioning' utopian acceptance and unrealistic faith in technologies' transformational capacity (attributable to all aspects of society) and one which is automatically deemed 'beneficent', leading to general 'improvement', 'progress' and 'modernisation'. Claims that educational technology could produce a more just, inclusive society, whereby the transformation of teaching and learning could serve social, emotional and economic ends (Sutherland 2008) although clearly exaggerated and aspirational, was promulgated in the ICT specific training programmes in which I participated during the early 1980s.

This enthusiastic and positive view, driven by an underlying belief in technology as some kind of 'technical fix' (Robins & Webster 1989), characterised by its 'power' to solve problems of a non-technological nature (often social problems quantitatively and qualitatively different from education's technical problems) has a long history, ranging from the introduction of radio, television and film which results in a tendency to ignore its ineffective or unsustainable outcomes (Cuban 1986). Often technical fixes will only deal with the surface manifestations not the roots of problems, distracting attention away from the realities and problems of contemporary education and society and producing unanticipated consequences in the process. For example, new information technologies as most information scientists have long recognised (and my previous research confirms) do not, as promised, speed up existing processes

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or make administrative tasks more efficient, but simply multiply the opportunities and possibilities for handling information in new and different ways, thereby increasing workload. Developments in communication (particularly e-mail) have rendered teachers, similarly, more readily accessible to parents and students in ways which are time and location independent and in some cases have caused information overload with all its paralyzing consequences. The teacher's new, multiple role, condoned by senior management for reasons of cost-effectiveness, has accentuated the high stress levels experienced by a profession already suffering from problems of recruitment, retention and from an aging workforce.

This rhetoric is evidenced by educators and institutions often decried in the popular press as being 'behind the times' in their use of technology in comparison with other sectors of society (Boody 2001). While myths are perpetuated which contrast 'digital native' students (Prensky 2001) with 'old', disinterested, incompetent teachers, more critical academic debate which questions the ability of any technology to transform education and to 'fix' non technological problems is under-represented in the media and professional critique is often silenced through anti-unionism and the denigration of individuals as 'Luddite' (a term both misunderstood and misapplied) or anti-modern (Cuban 1986; Robins & Webster, 1989).

Such partial discourse also encouraged an initial 'isolationist-impediment removal' focus of research, based on assumptions which advocated readdress of perceived barriers to technological process in education by increasing physical hardware, infrastructure and technical support, and latterly (due to a persistent 'failure' of ICT infrastructure to deliver) by an examination of 'other factors' considered to mediate the relationship between ICT and student learning; namely teachers, but in a 'problem' to be solved, capacity. Working from the premise that general ICT 'uptake' (defined narrowly by classroom usage, excluding lesson planning, preparation, reporting, dialogistic and assessment analysis) by teachers has been slow, a number of research studies proceeded to identify the factors which explain this in terms of a simple inhibitors and enablers format, stereotyping teachers often as 'innovators', 'exemplars' or 'unconfidents' and deliberate 'resisters' (Goodwyn et al. 1997; Scrimshaw 1997; Sepehr & Harris 1995; Trucano 2005; Cox et al.1999).

However, currently held assumptions that maximizing perceived enabling factors and minimizing inhibiters, through continued expenditure will produce

different results or that teachers as experienced professionals simply require *time* to assimilate and adapt to the new technologies through recognizable phases ('Assimilation', 'Transition' and 'Transformation') and that these processes are ultimately inevitable (Mioduser 2003) is still based on a determinist view of technology and human nature, with teachers acting as mechanical responders to the environment rather than as initiators of their own actions. However, since the initial premises on which the debate and research into education and technology has been based is flawed, no amount of further investigation will deliver the right answers to the wrongly identified problems.

Aims

Consequently, this study seeks to address the paucity of in depth qualitative investigations into the impact of ICT on the work and role of departmental heads (learners comprising too large a remit to cover although the former's perceptions of learning will be addressed) as central to the delivery of learning in secondary schools, by moving the debate beyond the deterministic view of education and technology and the simplistic 'cause and effect' impact which focuses on explaining why technology is not solving problems which is outside technologies' remit to address, to one which makes greater sense of educational phenomenon by reference to the broader context of the social, political and cultural conditions, arrangements and relations that influence all educational, structures, actions, processes and practices, including the use of digital technologies. Thus it is grounded in a recognition that although technology has an influence on social change (a 'softer' form of deterministic thinking), it is a two way relationship.

Thus the research approach will adopt a more 'social shaping' perspective as a way of understanding technology which acknowledges that any technological artefact is subject continually to a series of interactions, social constructions and negotiations with the social, economic, political and cultural contexts into which it emerges. (Bijker et al. 1987).

As an analytical tool to aid identification of these social structures (e.g. range of interests, social actors and influences) it will employ a combination of Kozma's (2003) framework for understanding the use of technology in schools by reference to its 'micro' (immediate, local contexts of learning and teaching as framed by teachers and learners) 'macro' (larger cultural, societal, political and

economic values) and 'meso' (organisational structures and goals of educational institutions) levels of description and Layder's (2006) four interconnected social domains model.

The thesis draws on qualitative research methods, including semi-structured interviews with forty heads of department in UK secondary schools (and five key informant interviews), enabling participant's perceptions and experiences to be expressed and analysed in the context of existing social structures in which they are embedded and to allow for the exploration of the meanings that the participants attribute to these encounters.

Moreover, by setting the research within an historical time frame (1980 to 2016) it will facilitate identification and assessment of long term consequences and patterns of continuity and change both for departmental heads and for the organisational processes, structures and environment in which they function.

Research objectives and questions

By being holistically focused, grounded in historical, social and political context, this investigation seeks to explore from a purely disinterested perspective, utilising a descriptive framework, how secondary school heads of department (at the intersection of lower and senior management) have responded to the introduction of ICT from the 1980s to 2016, exploring both continuity and change and seeking to understand within this context why developments have occurred, how they are perceived by the participants, how they have evolved and with what consequences for the profession in general.

Additionally, by giving those who are involved, namely; departmental head teachers, a hitherto 'denied' voice in explaining their perspectives, experiences and behaviours in their own words, it is proposed that the 'missing link' in this debate will be addressed and that a unique contribution to the advancement of knowledge and understanding will be made.

Consequently *my preliminary research questions* pertaining to departmental heads in UK secondary schools are as follows:
1. How has ICT changed the work and role of a head of department?
2. How have departmental heads responded to ICT innovation over time?
3. What have been the consequences (human and physical) for subject and pastoral departments of ICT innovation?

4. How has ICT influenced whole school organizational structure and managerial relationships?

5. What factors have restricted/facilitated departmental ICT implementation?

Structure of the thesis

This introductory chapter presents an overview of the rationale of the investigation and identifies the five research questions. Chapter 2 draws attention to the disparate nature of the phenomenon investigated and assesses some explanations and conceptualisations of educational technology within the domains of social science, science and the history of technology, arguing that without a more holistic, social shaping of technology approach, these theories are insufficient to offer an adequate understanding of the phenomenon. In conjunction it examines empirical evidence which it finds predominantly learning focused and positivist in orientation and identifies a further gap in the literature pertaining to the working experiences of middle managers with educational technology. To redress these imbalances it argues for an interpretative and qualitative approach to the study of senior school middle managers and educational technology within a broad context.

Chapter 3 explains the qualitative methodological approach of my investigation as considered most suited to answering the research questions. It positions both the research design and analysis within a framework conceptualised holistically in terms of multiple levels of social reality (Layder, 2006; Kozma, 2003) which facilitates some analysis of the broader agency-structure debate. The empirical data collected consists of interviews with heads of departments and key interviews with head teachers, senior managers, public examiners, newly qualified teachers, trade union representatives and educationalists within the British senior school sector. Chapter 3 also discusses ethical issues related to the research of individuals and reflects on my positionality within the research process.

Chapters 4 to 6 present the main findings from the empirical research, locating the specific research questions structurally within three levels of an adapted version of Layder's (1993) multi-level analytical framework (informed by Kozma, 2003) and the social shaping of technology, composed of a combination of 'self' with 'situated activity', 'setting' and 'context' domains. The focus of

Chapter 4 is primarily on the level of 'self', interconnected with its expression within the immediate workplace, delimitated as the subject department and activity with departmental colleagues. Chapter 5 considers the role of the oganisation, pertaining to the wider framework in which the individual is situated and the interactions encompassed. Chapter 6 centres on the significance of larger macro cultural, political, economic and social factors influencing issues of continuity and constraint at the macro level of analysis.

In the concluding Chapter 7, I discuss how the holistic, social shaping approach which underlies the empirical research answers the research questions with an evaluation of the adequacy of the theoretical framework for the analysis of the research data. Some contributions of the study are suggested in terms of the originality of applying a holistic, social shaping methodology to the empirical investigation of the relationship between middle managers and educational technology in the secondary school organisation and in the finding's overall conclusion. I then proceed to reflect on the value of the chosen methodology and assess its limitations. Finally, I consider general policy implications arising from the research findings and recommend areas beneficial to further research before offering some concluding remarks on the anticipated contribution of my thesis to furthering the knowledge and understanding of the subject investigated.

Chapter 2

Literature Review: Technology and Educational Technology

Introduction

This chapter reviews the ways in which the technology dimension of educational technology has been conceptualised within the academic literature. The first section discusses the small, but growing critical tradition, emanating from the social sciences domain which frames this review. It is exemplified by the work of the British academic and researcher, Selwyn (2011a) who argues for a more questioning approach to consensually held perspectives and assumptions about the way in which technology is thought about in teaching and learning. The second section contextualises the critique by discussing the epistemology of educational technology, highlighting the tensions between the social science and scientific domains within it and outlining the dominant theorisation of the role of technology as expressed in a causal and deterministic manner. The third section discusses a limited range of alternative approaches to conceptualising the relationship between education and technology, utilising sociological theories employed in the field of science and technology studies (such as actor-network theory and the social construction of technology), collectively referred to as the 'social-shaping' of technology in which my research is situated.

Educational Technology and a critical approach

Empirical research. Educational technology literature is not marked by a preoccupation with methodology (Selwyn 2002; Oliver 2011). However, the small but growing body of literature critiquing current positivist scholarship for its failure to explain the disparity between educational technology's apparent capacity for transformation and the reality of contemporary teaching and learning, is predominantly interpretivist in orientation. Although empirical evidence of negative correlations between computer use and student performance from Israeli, German, Dutch and Columbian high schools in the 2000s is highly questionable (e.g. Angrist & Lavy 2002; Lauven et al. 2003; Fuchs & Woessmann 2004;

Barrera-Osorio & Linden 2009) not least for its 'quasi-experimental' approach, current academic consensus from both interpretivist and positivist perspectives suggest that a sufficient and substantial body of empirical evidence, including an international perspective, documents a limited integration of educational technology into formal schooling practices and processes (Pelgrum & Pomp 1993; Underwood et al.1999; Anderson & Ronnkvist 1999; Kozma 2003; Madden et al. 2005; Law et al. 2008).   The absence of any real progress in explaining this phenomena after three decades of research is summarised in the oft quoted comment from a British educational academic; 'education is on the brink of being transformed through learning technologies; however, it has been on the brink for some decades now' (Laurillard 2008:1).

      Under-theorising.   Arguments proposing that the established educational technology research community is uncritical, avoids theory, self-reflection and self-analysis has been commented upon by a minority of scholars since the field's inception in the 1980s (Beynon & Mackay 1989; Kenway 1996; Kerr 1996). Kenway's specific criticism from a socio-cultural studies educational perspective is, unsurprisingly, that current research is still too micro-focused, demonstrating, she argues a wilful blindness to the wider implications of technology (2006 2013). Some researchers in the developing field, of more collaborated orientated, e-learning and network learning, which emphasises a relational view of learning, similarly observe that while clearly vulnerable to critique the mechanistic interpretation of technology remains prevalent (Jones, Ferreday & Hodgson, 2008; Friesen 2009). Whilst acknowledging the carefully constructed and wide-ranging critiques of such scholars, Selwyn claims that their arguments have been ignored by the mainstream academic community, prompting the likes of other educational scholars such as Apple, Bromley and Kerr to switch attention to fields of educational enquiry which are less insular and more open to criticism that the hostile world of educational technology (Selwyn, 2011b).

      Ahistoricism. The field's ahistoricism has been identified as a further limitation, particularly its forward looking focus, and an amnesia towards its flawed past. Although empirical evidence shows that technology has not been working in the prescribed manner, the academic community, (while tacitly acknowledging this fact) continues to avoid asking (and answering) difficult questions about what is actually happening in contemporary schooling (Selwyn, 2011a; Buckingham 2007; Pannabecker 1995).

A similar concern, calling not only for more critical and reflective practices in general to be demonstrated but also for a need to embrace a 'reflective historical understanding of technology' is expressed by some elements of the American educational academic community (Muffoletto, 2001; Apple, 2004). Muffoletto argues specifically for a more retrospective perspective which highlights the continuities and discontinuities between what is really new about digital technologies. The need to address both continuity and change in order to evaluate technology more objectively and to discredit utopian claims about technologies' capacity to change society is also proposed throughout the body of work analysing the concept of the 'information society' by British sociologist Webster (2006).

Some research, however, clearly falls outside this category. Cuban's extensive and widely credited investigations into the effects of educational technology in American schools over a period stretching from the 1980s to the current day, in particular his comparison of the 'failed' adoption of digital technologies in education with those of earlier media innovations (radio, television, film) is clear refutation (Cuban, 1986, 2002, 2008). However, such work is singular and the exception, reflecting his perspective both as practitioner and historian. As the digital media academic, Bassett posits, 'most new media technologies tend to be understood as determinant' and only reassessed later when they are no longer new (Bassett 2006:226). Selwyn consequently recommends that there is much to be learnt about digital technology and contemporary schooling from an examination of 'the literature of the 1980s and 1990s' (Selwyn 2011b: 39). He concludes that areas of contention and controversy in educational technology are currently under-scrutinised and 'knowing what works' has become the stock response in debates surrounding the issue.

Microfocus. Selwyn's persistent (over a decade) call for a more social scientific approach to current educational technology in terms of its theoretical understanding and methodological pursuit, reflects his own theoretical background in the social sciences and his extensive research into the sociology of technology. That after twenty years the general lack of self-reflection and self-assessment of procedures and practices is still debated as a controversial issue is acknowledged by other educational academics (Friesen 2009; Oliver 2011; Facer 2011). Recent criticism specifically addresses two aspects of current study. Firstly, its narrow focus, which excludes an understanding of the wider social,

cultural, political and historical context or milieu of education. Secondly, its under- theorising and over-emphasis of the technological dimension of the educational technology dynamic. The latter includes technical processes such as the development and design of technological artefacts and the role of 'learning technology' which purports to facilitate the 'act of learning' (Selwyn 2010:67) which together reduces educational technology to a simple technical issue of aligning mind and machine (Selwyn 2010).

In this respect Selwyn is positioning himself alongside a minority, critical tradition of American educational technology academic writers and researchers such as Bromley (2001) and Apple (2006, 2004) and the more general educational scholarship represented by educational theorists such as Biesta by suggesting that an understanding of contemporary education requires a focus on issues beyond immediate learning to its political and social dimensions (Biesta 2006). Bromley critiques the general absence of social context questions (e.g. Who is using the technology? Why? Towards what ends? Under what conditions? With what resources?) in reference to his own empirical research (technology use in urban elementary schooling) which seeks to address such issues (Garrison & Bromley 2004). In his research as Canada Research Chair into e-learning practices, Friesen, for example, also calls for a *ground-clearing* exercise in order to call into question ways of talking about 'e-learning that obscure a more complicated reality' (Friesen 2009:181). A similar conclusion, emphasising the importance of the wider context-rich as opposed to context-free analysis in understanding technology is naturally reflected in the educational studies of British sociologists Robins and Webster (1989), in what the latter refers to as 'the intimate connectedness between wider contexts and conceptualizations' and the 'particular' (Webster 2005:453). Selwyn's sociologist's perspective on education, which orientates naturally towards the broader dynamics at work in the functioning of modern educational systems is also supported by British sociologists writing on popular and digital culture such as Beer and Burrows. The latter call for more 'critical, distinctive and thick sociological descriptions of emergent digital phenomena', which requires locating them in 'broader frames of theoretical reference' (Beer & Burrows 2007:1).

Not all critical literature has an interpretivist orientation, however. Supporting general criticism but emanating from a very different direction is the work of Crook in the field of psychology. He agrees that current debates on

educational technology privilege an immediate and particular context of the learner and the artefact at the expense of wider factors (Crook 2008). As such his view represents a growing perspective and consensus, at least within British psychology, which addresses more of the social, as distinct from the technical processes of learning (e.g. Luckin 2010; Leask & Younie 2001; Bracken & Lombard 2004). This 'cultural and collaborative' psychology emphasises the socially collaborative nature of learning where 'the construction of knowledge is seen to be nurtured and supported by a wider community of learners, teachers, technologies and other objects' (Selwyn 2010). Whilst acknowledging its strengths in promoting the notion of learners and digital technologies as being blended with a range of human and non-human elements in a learning environment, it still retains limitations in terms of insufficiency of explanation. For although it goes some way to explaining how learning with technology *can* occur, it fails to explain *why* it takes place, or indeed fails to happen in actual life contexts (Selwyn 2010).

Acknowledging some evidence of contemporary research which emphasises the social dimensions of educational technology, criticism continues to centre around the view that many educational technologists are 'closed' to the implications of new findings and perspectives and continue to perceive technology itself as un-problematic. Sociologist Bromley observers that despite a century's worth of social science findings, when educational technology is discussed such well-established findings and theoretical frameworks which have been developed to explain them are ignored and usual considerations are not seen to apply; as though technological practice alone among human activities takes place in a pristine world of its own (Garrison & Bromley 2004).

Several scholars from a post-modernist, political science perspective cite the omission of any analysis of power relations, for example, as a major weakness of educational technology studies. The research of explicitly premised, post-modernist, scholars such as Hlynka (1992), de Vaney (1998) and Bryson & Castell (1994) who sought to redress this balance in the 1990s by emphasing the subject's lack of pluralism and its preoccupation with evaluation in the field over criticism, has remained a minority perspective. Their emphasis on encouraging a constant rethinking of beliefs about technology and highlighting power relationships, particularly those of corporate interests and technologies in the classroom is, however, reflected in more recent research albeit from outside the

traditional field's domain. Within the field of British Management Studies, Greener and Perriton's (2005) examination of the relationships between capitalist modes of production and use in schools, in order to uncover the underlying power relations, is of this category.

The American political theorist, Langdon Winner's (1993) widely debated article emphasising Robert Moses' politically motivated construction of bridges in 1920s New York is still employed to focus attention on the inadequacy of the way in which technology-based processes remain unexplored. Employing engineering parlance some critics describe how they are given 'black box' status (a device which abbreviates complex technical processes to limit analysis to their inputs and outputs) and any understanding of what happens within the 'black box' is deemed inconsequential; the instruments merely credited with performing valuable functions (Nye 2007). Indeed, the reluctance of contemporary writers to recognise the political dimensions of technology has led to the development of a separate field of study; 'the political economy of technology' which emphasises an analysis of technological artefacts within its broader socio-political milieu (e.g. Noble 1991, 2002). The latter study focuses interpretations at a singularly political level on policy-making and the economic and commercial activities of firms and governments, examining how institutions, political environments and the economic systems intersect and influence each other at the point of technology. The American scholar's Pfaffenberger's (1992, 2001) social anthropological theory of technology which identifies ways in which technologies are appropriated and re-appropriated by political and economic interest groups in ways that diverge from the intentions and claims of designers exemplifies this manner of redressing the analytical imbalance.

Technological determinism. Employing assumptions which attribute technology a 'given' and unproblematic role in education can be criticised for producing partial analyses and leading to simplistic and misleading explanations of the development, deployment and effects of ICT in education and schooling. The early attempt by Saettler (1990) to define the field is an exception. The more prevailing uncritical research direction which fails to pose fundamental questions about whether the 'machine' has an essence or how technology actually operates in practice (as opposed to an idealised version) has led some scholars within the humanities and amongst the few historians of technology who focus on educational technology, to agree with Winner's criticism (1986) that the

educational debate is one constructed in an uncritical vacuum.   Evaluations which accord with Selwyn's call for the posing of questions and the initiation of ways of thinking about educational technology that are different from those normally addressed in the educational technology literature (Selwyn 2002).

Such minority views criticise the majority of educational technology research which adheres to technological determinism and the understanding of technology in 'a common sense way' (Oliver 2013a). The latter view narrowly crediting technological developments (man-made tools, machinery and inventions) in determining and shaping the content of historical and social change, in a manner which is predictable, traceable, linear and inevitable (Williams, 1996) as illustrated by the frequent description of historical eras in terms of 'the age of steam', the 'atomic age' or 'the digital society'. Within orthodox technology theory, however, two strands of determinism are usually distinguished based on the relative weight given to the technical and social factors of change as positioned across an imaginary technical, non-technical continuum. In its most extreme or 'hard' form, as described by historians of technology such as Nye (2007), the theory denies any human agency or free will element in determining social change; technology being the sole (sufficient or necessary) determinant.

Historians of educational technology such as Pannabecker criticise educational technologists for exhibiting outdated views pertaining to technologies as having inherent qualities, capable of impacts, which have long been rejected by most of the scientific and technology studies academic community. In a key article in its field (1992), he identifies the limitations of assumptions which view the relationship between technology and society as one that can be reduced to a simple mono-causal formula in which human behaviour is largely determined by, rather than having influence over, technology. Of its several variants he cites researchers adherence to its most primitive form; 'hard' determinism as epitomised in the term, the 'impact' of technology, arguing that this has become the dominant metaphor for conceptualising and promoting the relationship between technology and society within the educational technology community. A phrase, which by denoting a striking together from a dynamic force, causing a collision or shock on society (likening the impact of technology on society as that of a hammer on a nail), represents thinking which sees the world clearly divided between the technological and the social; a mechanistic one with technology the dominant force within it and as such essentialist, and flawed.

However, he does acknowledge that historians and social scientists are obviously utilising very different approaches to knowledge and understanding. At one end of the spectrum the historian is collecting evidence and writing coherent narrative, at the other the social scientist is employing models or frameworks to organise and interpret historical evidence. Although observing the limitations of systems models (e.g. input, process, output, feedback) and quantitative methods in terms of their explanatory power, Pannabeckere does argue that both approaches are needed for understanding the subject (albeit their differences will affect research question formulation). He concludes with a preference for Bijker, Hughes and Pinch's (1987) more integrative, as opposed to non-linear models, but qualifies that both risk presentation of distorted views if historical evidence is forced to fit within them (Pannabecker 1995).

From a social science perspective, scholars such as Grint and Woolgar (1997) are less accommodating and attribute essentialist views to intellectual laziness, whereby crediting technology with an essential capacity to account for the way in which society functions is easier than isolating and analysing a host of other social factors which generate and support it.

Affordance. Research into whether, and to what extent, current empirical studies actually adopt this stance has been undertaken by the British education and technology academic, Oliver (2013b). He argues that a review of ten year's worth of research in six educational technology journals reveals only ten where the focus was on technology; five pertaining to affordance, three on technology as part of a system and one on the social shaping of technology, the rest he describes as displaying a 'common sense' view of technology. The debate concerning the concept of affordance is particularly relevant to my research since it features prominently in current educational technology empirical studies. Although interpretations vary, most agree on its origins in the evolutionary psychological work of Gibson (1979), pertaining to the relationship between animal and environment (Oliver 2005). Oliver argues that current theories of affordance, where technology (with concrete, purposeful, affordances located within it) is understood in terms of what it can do to humans, including its restricting and constraining power, and the conclusions to be drawn from it to further technical design (efficiency), are simply attempts at functional understanding and thus deterministic. Technology is still perceived as operating like a simple causal black box, the only questions being asked of it relate to efficiency and control.

Conole and Dyke's (2004a) discursive articles, which have stimulated further debate on affordance, defend their employment of the concept by emphasising that they also focus on the *possible* use of objects, and that they are interested in both technological infrastructure and human use of technology. The latter have additionally posited the possibility of exploring the innovative way in which people respond to technologies and adapt them to unforeseen circumstances (2004b). Arguments which can be critiqued for the obvious discrepancy between the espoused social basis approach and Gibson's explicit non-social, non-constructivist position (Boyle & Cook 2004). Indeed, Oliver's retort to both perspectives is that they are still fundamentally concerned with the properties of things and so pursuant of the positivist, essentialist position.

The more nuanced, but related concept of *social affordance* (e.g. Jones 2005; Boyle & Cook 2004) whereby properties are viewed as embedded in computer supported learning environments or tools, which act as social facilitators can also be criticised for limited analysis. Oliver (2013a) argues that they miss the point by failing to offer new possibilities for action, but simply encourage particular social activities via signposting. In contrast, Selwyn suggests that Hutchby's (2001) notion of *social affordance* is quite distinctive and anti-deterministic, by perceiving affordances as possibilities for action and by referring to what people perceive and signify during their actual interaction with a technological artefact (Selwyn, 2011b:47). Oliver nevertheless, critiques such authors for attempting to give the impression of a social focus, often by employing case studies and practice description, while their primary intention is to identify the 'general, 'decontextualised *properties* of technology' (Oliver 2011:375). However, within the field of the philosophy of education there has generally been a recognition that most educational technology researchers emphasise artefacts and methods of adoption, while underplaying all elements of social factors, meaning, and knowledge in the learning process (Derry 2007).

Research which claims that technology rendering 'impacts' or effects on learners, teachers and educational institutions predictable, if used in the 'correct' manner, and 'false' claims that computer-mediated communication has caused a decline in literacy standards or that digital technology leads to improvement in learning, is illustrative of this thinking in practice (e.g. Bennet & Bennet, 2008; Shaffer 2008; Sutherland et al. 2008). The British media and education scholar, Buckingham (2007) has observed how the educational literature abounds with in

depth investigations of model educational institutions and classrooms where well-resourced students bask in the glow of the *Hawthorne effect.* Fellow academic Facer (2011) whose research focuses on the relationship between educational institutions and the wider society is equally critical of studies employing superficial rationalisations to 'explain' actual lack of change or 'failure' in digital technology performance. The latter 'incorrectly' attributed, she argues, to structural barriers and individual deficiencies within the local context, as usually represented in the form of 'inadequate' teachers or educational institutions which delay the inevitable march of technological progress (e.g. Drent & Meelissen 2008; Ertmer & Ottenbreit-Leftwich 2010). Both perspectives concur with Garrison and Bromley's (2004) critique that for such researchers the classroom is treated as an empty landscape, passively waiting to be shaped by innovations from elsewhere.

Applications of the implied lack of 'agency' in such assumptions has been explored by the American educational academic, Boody (2001). The latter's analysis stresses the perception of a lack of maneuverability or deviation from any other form of social agency in the implementation of technology, positioning teachers and students as responders to technological change. He observes that the symbolic association of technology with modernity, the march of progress and the allure of the new has compelled education to function in a manner resembling Darwinian survival, in so far as the most 'appropriate' innovations survive and only those who adapt to such innovations prosper. This view of the 'imperative' of education, a creation which involves a constant response to technological advances irrespective of need, whereby education is running simply to 'keep up' in order to avoid appearing behind the times in comparison with other sectors of society is illustrated in the enforced response to the concept of 'digital natives' (e.g. Prensky 2001). Several scholars have exposed the manner in which non-academic commentary becomes accepted into the academic utilising this generational division myth of technology (Bennett et al. 2008; Kirkwood & Price 2013; Maddux 2009) highlighting the dangers of limited scepticism in the process.

Some academics agree that a body of literature distinct from what Selwyn describes as popularist *techno-romance futurists* (e.g. Naisbitt 1984; Toffler 1980; Negroponte 1995 and Gates et al. 1997), emanating from American scholars in the field of information studies and psychology and promoting the necessity and

inevitability of educational improvement via technology, has coalesced into a powerful impetus for educational change, expressed in stark terms and (mis)directing the focus of academic educational technology research. As the formative information scholar, Castells (2010) warns for example, the assumption that if technology is beneficial and transformative for society, by implication it must be so for education (based on perceived overlaps between the common educational and digital technology characteristics involved in the production and dissemination of knowledge), is founded on weak logic.

Historians of technology (Smith et al.1994; Nye 2007) have criticized an information and society theory which reflects the crude expectation that history shows technological innovation driving social progress in an inevitable course. The latter often idealises its 'revolutionary' capacity in terms of information storage, processing and retrieval, which is extrapolated to have inaugurated a post-industrial, information society with beneficial economic consequences (higher productivity, economic growth trickling down from centre to peripheries) as illustrated in the works of American scholars such as Bell (1973), Drucker (1993), Machlup (1962, 1980-84) and Porat (1977). In such a category is the much debated myth of the young 'digital native' created by the new technology practices and 'compelling' the use of similar technologies in their learning and teaching environment (e.g. Prensky 2001; Mahiri 2011; Abbott & Adler, 2009).

This analysis presents a fatalistic sense of social institutions as having to react to technological change. A conceptualisation which is also reflected in claims that the fluid nature of digital technology processes are 'flattening out bureaucratic hierarchies in organisations, encouraging more open configuration of social relations (Friedman 2007), and as some information scholars have argued, is facilitating greater individualisation of needs and enriching personal communication and social capital (Haythornwaite 2005). The British sociologist Gane (2005) has unequivocally argued that internet-technologies have 'radically' altered all the three main spheres of social life including production, consumption and communication. This rendition of change is contented in the critical analyses on information society by fellow sociologist, Frank Webster (2005, 2006) who draws attention to the very contentious nature of the whole assumption that digital changes in communication issues are automatically revolutionary and have changed post war society. In contrast, he concludes that explaining 'informatisation' in terms of historical continuities is a better way of

understanding society, arguing that the whole 'social *impact* approaches towards information are hopelessly simplistic and positively misleading' (2006:5).

Polarised debate. Several scholars have emphasised the implications of determinst thinking in undermining, enlightening academic discussion and of polarising and stultifying debate. The Canadian educationalist, de Vaney (1998), for example, recognised that ascribing labels to advocates and opponents of new technologies and assuming entrenched positions of either for or against, causes any objective assessment of the relative strengths and weaknesses of technology to be effectively subsumed in the process. From an academic and educational action researcher's perspective, Somekh (2007) agrees that the continuation of dualistic imagery has imposed serious constraints on contemporary thinking within educational technology discourse. She critiques such manifestations on threefold grounds; that they are ethnocentric and culturally chauvinistic in their definition of progress (and change and progress are not synonymous), disputed in their evaluation of revolution and misleading in their implications that new technology neatly replaces the old (e.g. TV, cinema, computer) rather than recognising the interplay and subtle shift of function between congruent new and older media. Moreover, by thinking that technology is inherently 'good' or 'bad', she argues, implies assumptions that choice is restricted to one or the other (i.e. all technology or none). Consequently, perspectives on new technologies have retreated into a dualism, where in effect the two positions frame two different 'machines', with different capabilities and values, offering entrenched positions of good-bad, for or against, and with little shades of grey or compromise in-between. Thus any criticism or expression of doubt is dismissed as anti-progress, technophobic and Luddite, but with a preponderance of the former (Somekh, 2007). Such criticisms are supported by some communications scholars who have observed how the argument has been rendered into an over-simplified dualism between those who regard technology as inherently good, stereotyped as 'technophiles', or bad, labelled, 'technophobes', with a group occasionally located midway and adhering to technology as neutral, as 'technoneutrals' (Tehranian, 1990). Friesen (2008) for example differentiates between 'optimistic' and 'pessimistic' determinism, the former which focuses on the positive aspects of technological change, the later on the negative, and critical of both for recognising technology as the sole determinant of change.

Exploring the dualism in greater depth, Australian educational academic,

Bigum (1998) has identified four clusters of discourse. The first groups comprise minority conservative *doomster* and *criticals* which he argues over-value past educational practices and knowledge, are nostalgic for print technology and bemoan student dependency upon spell checkers, the internet and other computer aids. An interpretation allied to some commentator's (e.g. Keen 2007; Whitworth 2009) focus on the detrimental cognitive effects of digital technologies on thinking and learning, such as information overload. All of which often offer highly simplistic views of complex socio-technological situations (Boal & Lakoff, 1995). Such views arguably reflect a broader tradition of negativity to technology in the tradition of Ellulian fatalism (i.e. technological solutions produce new problems but from which there is no escape). Some information society theorists (e.g. Schiller, Hamelink, Habermas, Giddens) are credited with leading and supporting such thinking, by focusing on a wide range of socioeconomic threats, ranging from inequality, civil rights, surveillance, unemployment, deskilling and cultural homogenisation, (Webster 2006).

The second and majority grouping which Bigum differentiates from *doomsters* are positive *boosters* who regard technology in over-simplistic terms, as a natural enhancer of learning and the extreme *anti-schoolers* who view computers with sufficient inherent capacity to revolutionise learning and eradicate the social institutions associated with it entirely irrespective of external factors such as pedagogy, effort, thought and discipline. Within this discourse, schools are positioned as slow, inefficient and industrial-age structures to be swept away since putting computers into a school is akin to putting an internal combustion engine into a horse (Perelman 1992).

In seeking to explain this thinking Robins and Webster (1989) argue that the enthusiasm for educational technology is driven by a belief in its capacity as a 'technical fix', the efficacy and reliability of these products being accepted at face value, a view characterised by its history which shows a consistent faith in attributing media technology (e.g. radio, television) with the power to solve existing educational problems, ignoring the ineffective unsustainable results in a cyclical pattern of 'exhilaration/scientific credibility/disappointment/teacher-bashing' as earlier identified, (but widely ignored within the educational technology community) by Cuban (1986:5-6). The fact that educational problems are considered by most social scientists to be social, multi-causal, non-technological in nature, quantitatively and qualitatively very different and

certainly operational in a fashion very different to that of the closed system within which technology problems are viewed, has been largely ignored by the majority of writers within the field of study.

Selwyn (2011a) observes that the implications of empirical evidence which clearly demonstrate that not all technological advances have been enacted has encouraged the development of a more 'soft' or diluted view of determinism which currently pervades the literature on schools and technology. Consequently, rather than claiming that the internet improves learning, it can be said to *help* improve learning, acknowledging the existence of other contextual influences whilst retaining the notion of technological impact on classrooms or whole schools in ways which are to a degree still malleable and controllable. However, as Nye (2007:9) argues the overall impression still remains that 'devices and machines..are...things out there that invade life.' Whist ascribing a degree of agency to the technological artefact rather than to the non-technological process which shaped its development, the view still results in a narrow reductionist understanding of educational digital technology.

Some writers emphasise that the compatibility between educational technology (employing a narrow definition of the field) and technological determinism is unsurprising since both are epistemologically positivistic, having origins in such disciplines as engineering, natural sciences, mathematics and psychology (Selwyn 2002, Oliver, 2011; Czerniewicz, 2010). As a mode of explanation technological determinism reflects the scientific paradigm, and reductionism where knowledge acquisition occurs through the separation of things into component parts, in which parts are assumed to affect other parts in a linear fashion, interpretation then proceeds from parts to the whole. Consequently, as an explanation of change it is logically mechanistic and monistic (rather than multi-causal) offering a single cause or independent variable. Garrison and Bromley (2004), however, argue from an interpretivist perspective that such approaches which position digital technologies as *independent variables*, having one-way influence on the *dependent variables* (e.g. student achievement, pedagogy, school culture) and which ignore the possibility that existing complex social networks might condition the use of computers in specific or unexamined ways (rendering the computer a dependent variable), simply fail to explain education phenomena sufficiently.

Several academics employing a broader definition of educational technology, while acknowledging the potential usefulness of the positivist methodological approach, criticise its domination of the field, albeit in cautious tones since most of the leading journals in the field (e.g. *the British Journal of Educational Technology, Computer Assisted Learning, American Educational Research Journal, Review of Educational Research*) are 'technicist' and or learning science orientated (Selwyn 2002). Pannabecker argues that despite their deficiencies in application to complex social phenomenon, such theories also continue to hold sway because of their ability to make strong, simple claims about cause and effect. If technology is perceived as a phenomenon with an independent existence (with mass, velocity and momentum of its own) ordered according to processes and laws, capable of being understood from an objective standpoint, content and direction and with resulting impacts, it can be empirically studied and tested objectively, via case studies, employing rigid conceptual frameworks and simple step-by-step guides which, if justified, make explanatory and predictive theory (Pannabecker 1991). Muffoletto (2001) reflecting a minority North America educational critical tradition (e.g. Apple 1997; Saettler 1968; Feenberg 1991) concurs, suggesting that this persistent recourse to the simple identification of otherwise complex socio-technological causal relationships is due to a desire by the governmental sponsors of much American research, to reduce the 'uncertainty (including the teaching variable) from the schooling process in order to provide a systematic, scientifically-based, controllable and measurable process which can identify and solve the perceived ineffectiveness of the public education system. Because mechanistic theory causes are explicit and intentional and consequences predictable, Selwyn (2002) similarly argues that simplistic, bounded scientific explanations which he refers to as rigid technicist paradigms and models essential to the determinist mindset, are equally appealing to publicly funded sponsors and due to the relative simplicity of enquiry, to university education departments, facilitating research tasks for their students.

Central to Selwyn's criticism of educational technology research is the domination by a forward-looking, leading-edge focus, which concentrates on a rhetoric and presupposes what education in the digital age 'could or should' look like in the future rather than the actualities (Selwyn, 2010:69). Nye (2007:35) similarly observes that all technological predictions and forecasts are in essence

little narratives about the future. 'They are not full-scale narratives of utopia, but they are usually presented as stories about a better world to come'. While acknowledging the appeal of the predictive element, Selwyn concludes by urging the adoption of a more in depth, qualitative approach to educational technology research in order to combat a state of the art rather than a state of the actual perspective (Selwyn 2002). Unlike the vast majority of other areas of social science research, he argues, the field of educational technology remains peculiarly impervious to qualitative methodology and analysis. Although he regards over reliance on any method as restrictive, however, he does argue that the addition of a qualitative dimension to the purely quantitative approach would allow research to focus on the fundamental and hitherto neglected aspect of what *does*, as opposed to what *could* happen when technology is used in educational settings (Selwyn, 2011a).

Educational technology and epistemology

As some academics observe much of the debate within the subject stems from the disparate nature of the discipline itself, suggesting that many scholars would refute the discrete existence of educational technology as a field altogether. Selwyn contends that it 'serves merely as a flag of convenience for a loose assortment of technologically minded psychologists, pedagogy experts, maths and science educators, computer scientists, systems developers and the like' (Selwyn 2010:65). In an analysis of articles, drawing on what international researchers and professions in the field report about its composition, Czerniewicz (2008, 2010) suggests that there is some validity with his viewpoint. For her studies also illustrate the underlying tension at the heart of much conflict, namely the different epistemological positions of those who argue for educational technology as a science, and those who contend that it is a social science.

Although evidence suggests a consensus amongst scholars of its international existence as a field, from the UK and USA to Australia and South Africa (Coutinho & Gomes, 2006; Czerniewicz et al. 2006; Alexander et al. 2006), the extent to which it is coherent and bounded is disputed. Czerniewicz (2008), from an educational psychology perspective, argues that perceptions range on a continuum which she categorises as *unified*, to *nascent* to *fragmentary*, which would suggest a reflection of a science-social-science split. Within the

unity camp authors from the domain of 'instructional design' (also 'instructional' and currently 'educational technology'*)* argue vigorously that the field is firmly based in the scientific paradigm and would align themselves with a Kuhnian version of the field (e.g. Elen & Clarebout 2009).   Some prominent American researchers in instructional design, such as Merrill, would even describe the subject as a discipline.   This clear positivist approach and its entrenched position in US universities is clearly presented in publications that claim: *'Like all science, the science of instruction is based on specific assumptions about the real world. The technology of instructional design is founded on scientific principles verified by empirical data... persons who claim that knowledge is founded on collaboration rather than empirical science or who claim that all truth is relative are not instructional designers...'* (Merrill et al. 1996:5-6).

Some British educational academics also argue that this interpretation of the domain is further secured and disseminated (to Europe and South Africa) by several key factors; clear definitions published by an acknowledged association, specified professional competencies, agreed sources of research findings and key journals (Ely 2000). Applying Bernstein's theory of knowledge structures (2000), where metalanguages are employed for basic orientation, language of description and the rules for understanding how phenomena are to be understood and interpreted, Czerniewicz argues that the field appears highly robust and consequently impervious to the external critique from its social science counterparts, to which it makes no response or feels no need to address (Czerniewicz 2008).   If a researcher were to 'decry scientific method' for example, they 'don't need to be cast off; they have exited on their own' (Merrill et al. 1996:6).

Czerniewicz's second group or *unity c*luster (termed 'learning technology' or 'learning science' in the UK*)*, differentiated from, but overlapping with 'instructional design' and based on psychological learning theories is similarly an entrenched domain, imperious to its critics claims that its theoretical and philosophical learning theories have dominating educational technology for the last twenty-five years (Selwyn 2010). Avowedly scientific in approach, it is hypothesis and test driven (variable correlation), involving experimentation, either within controlled laboratory settings or field-based, artificially controlled situations. From an American research perspective it continues to be dominated by *instructionist* theory incorporating Skinner's behavioural analysis, and utilising

Gagnean computer based design concepts. Based on the premise of an external reality with which individuals must come to terms, it is logically in conflict with interpretivist approaches to understanding the world. Despite, some reflexivity within the field as expressed by those who suggest it is time to move beyond the Skinner-based impetus for hundreds of empirical studies, its appeal is still acknowledged for scientists due to its order, scientific precision, the recognition of Skinner's continued dominance (Gordon & Zemke 2000) and its accessible conceptual framework (Bichelmeyer 2004).

A clear difference, however, in British and American emphasis, is evident, Czerniewicz suggests, by the former's growing acceptance of *constructivism* (based on the theories of Dewey, Piaget, Vyotsky) which takes more account of the situated and collaborative nature of learning, as represented by a relatively small body of empirical work often found in 'Networked Learning' studies (e.g. Jones 2004; Friesen 2009). While offering new perspectives, however, some more reflexive American commentators recognise that it has not been adopted in the US because it lacks the specificity that attracts researchers (Driscoll & Dick, 1999). Although some UK social scientists naturally welcome the new direction, regarding the blend of digital technologies with human and non-human elements more acceptable to their epistemological position, the contextualization is criticised for remaining too immediate and insufficiently broad. Not only is 'real-life' analysis absent but 'at best the learning science approach tends to frame 'ineffective' use of technologies for learning in terms of various assets and deficiencies within the learning environment such as learners, teachers, institutions (Selwyn 2010:67). As such the apparent 'failure' of educational institutions is still attributed 'incorrectly' to the fact that educational institutions and those within them often lack what it takes to go with 'the educational flow' (Dale et al. 2004).

While some scholars argue forcefully that the field (and/or discipline), is scientific with a 'single over-arching paradigm as in the natural sciences and that the majority viewpoint is positivist, there are others, within Czerniewicz's small *nascent/fragmentary cluster* who consider it to be a social science (e.g. Luppicini, 2005; Whitworth & Bensen, 2006) with all its attendant challenges and would suggest that being inter-disciplinary (Jones 2005) or multi-disciplinary (e.g. Whitworth & Benson 2006) is a strength. Oliver (2011), for example, cites the positive aspects inherent in any multi-disciplinary approach due to the varied

perspectives which can offer richer explanations of phenomena. However, since the issue is not resolved between all academics so positively, the tensions expressed almost two decades ago in 'a positivist/modernist and post-modern dichotomy' (e.g. Banville & Landry 1989; De Vaney 1998) remain relevant today (Czerniewicz 2008:175).

Some scholars within this category would disagree strongly with any concept of unity or common postulates, illustrating what Bernstein (2000) would refer to as a field's weak grammar (employing few shared terms, concepts and rules but employing a multiplicity of ones).   The field has been described variously as amorphous, disjointed, lacking consensus definition and clear focus with little evidence of a body of knowledge to support practice despite its fifty year history (De Vaney & Butler 1996; Hedberg & McNamara 2002). The study by American sociologist, Menchik (2004), which employed Bourdieu to analyse 'cybereducation' in the UK school sector (via the National Grid for Learning) shows similar findings regarding its emergent status. Additionally, some academic literature focuses on apparent problems inherent in the relative youth of the field (Dueber 2004; Jones 2004; Luppicini, 2005).   Conole (2003) specifically observes limitations due to its early stages of development, referring to the growing body of research into what is termed variously as *digital learning, e-learning or learning innovation* in British university educational departments, although the subject has actually been researched for over three decades. Even language (ostensibly intended to formulise and confirm key aspects) suggests that it is still growing, as illustrated in the 2006 Instruction Technology Forum's paper urge, 'for a common knowledge base with a consistent terminology (which) *would* great*ly* facilitate the future development of knowledge in this important area (Reigeluth & Carr-Chelman, 2006).   A few academics stress that the subject is still so new that they do not have the language to describe what they are observing (Dawson & Ferdig, 2006) implying that vague and inconsistent language is actually impeding its growth. Hedberg and MacNamara (2002) propose that this might be further complicated by different facets of the field dominating at different times.

Several researchers and practitioners, however from surprisingly divergent theoretical positions agree on the identification of deeper problems within the field particularly the need for increased coherence in methodological rigour and standardisation. Oliver (2011) for example expresses concerns about the

credibility of the research methods employed. A view previously and vigorously articulated by fellow academic, Mitchell (2000) in his call for radical reappraisal of methodology in university education departments world wide. He specifically urges a thorough questioning of both the results and underlying paradigms exhibited in current educational technology research, claiming that 'much published research about education and the impact of technology is pseudo-scientific; it draws unwarranted conclusions based on conceptual blunders, inadequate design, so-called measuring instruments that do not measure, and/or use of inappropriate statistical tests' (Mitchell 2000:48).

Other quantitative researchers identify a need for common code, books, heuristics and descriptors in order to facilitate comparisons (Ballachef 2006; Dawson & Ferdig, 2006). Facer's research into educational and social futures at Bristol University has led her to support the claim of an absence of rigorous validation in educationally technology study and to criticise the effective acceptance of unproven 'pseudo scientific ideas' which facilitate and perpetuate myths and narratives about education's relationship to socio-technical change, usually based on negative assessments of 'failure' and 'inertia' (Facer 2011:2). A similar perspective was articulated by the American educational psychologist, Maddux (2009) in his response to Prensky's (2001) controversial and much debated article, conceptualizing 'digital natives'. The former warns of the dangers inherent in limited scepticism and concludes that when lack of scepticism becomes widespread, 'progress in any discipline is likely to come to a halt' (Maddux 2009:3). Much of the general criticism pertains specifically to quantitative empirical research. The danger being as Bernstein (2000) warns that once empirical work becomes associated with a particular ideological position, rather than explanation, and that stance is subsequently exposed, all the work associated with it may be written of in its entirety.

There is, however, international evidence of an agreed research agenda in the field regarding research issues, themes and objects of attention which is primarily on the social, organizational and pedagogical level, with a more human, as opposed to technological focus (Czerniewicz 2008). Learning issues such as collaborative learning, non-traditional, role of the teacher and teacher-student relationships, are prominent as are issues of inclusion, accessibility and the digital divide, largely because they are considered insufficient. At the macro level, issues of the institutionalisation of technology are also evident. What is

noticeable by its absence, as the 'critical studies' group argue, is a focus on the technological through an analysis of specific types of technology, technological trends and assumptions about technology itself (Freisen 2009; Oliver 2011; Buckingham 2007; Selwyn 2010).

A few scholars within the dominant domain of instructional technology have agreed that it has proved relatively 'closed' to external influences and new ideas. Referring to the predominance of Gagne in empirical research, Driscoll and Dick (1999) stress that there has been no new real theory that has driven innovative research. Other significant international researchers have criticised the continued reliance on approaches which stultify the field: 'Our field will have no future if our researchers do not see ways of pushing the boundaries of thinking and moving them forward...writers such as Gagne do not hold the keys to the future of education technology' (Kozma 2000).

The following section consequently reviews what Czerniewicz identifies as the least powerful of the domains, that of sociological theories where consensus is displayed through an emphasis on social rather than technological theories and where there is wider agreement about the relationship between education and technology, with meaning and agency primarily in the social, rather than in the technological. In particular it focuses on what Brey (2003) and Selwyn (2011a) refer to as *the social shaping* approach to investigation.

Alternative theories for understanding education and technology

Anti-essentialism.   In contrast to the field of education technology, within the science and technologies studies (STS) literature, technology has been widely debated and theorised and a more radical 'corrective' to technological determinism has been advanced through the 'anti-essentialist' approach of a number of sociologists who attribute no inherent qualities to technology.   Theory attributed primarily to Latour (1987; Latour &Woolgar 1979) has been further developed by British sociologists Grint & Woolgar (1992, 1997), Woolgar & Cooper (1999) and Norwegian sociologist, Sorensen (2002) and considered applicable by some writers (Selwyn 2010; Oliver 2011) as a more effective methodological basis for empirical research in educational technology. Such theory rejects the single, linear narrative of socio-technological change and proposes a more sceptical relationship between machines and humans; one that is

open to human interpretation. Woolgar & Grint have long criticised the 'soft' determinism of educational technology research which still retains what they describe as 'residual technicism'. Selwyn also credits the theory of anti-essentialism as an antidote to the development of the current 'soft' deterministic conceptualisation of digital technology whereby technology is still seen to impact on social situations, for example, where classrooms are still perceived in ways which are malleable and controlled. Instead of the Internet directly improving learning, such perspectives acknowledges other contextual influences by arguing that it can *help* improve learning while retaining the notion of technological effect.

Such critics have welcomed the more sceptical relationship between human and machine presented in STS theory as exemplified in Grint & Woolgar's (1997) employment of the metaphor of technology as *text*, in which it is configured (*written*) in certain ways by various social groups (e.g. producers, marketers) during its development and interpreted (*read*) by others (e.g. consumers and users) later. Although the technology may have preferred *readings* built into them by dominant interests, the reading and writing processes are seen as open and negotiable.

Selwyn (2011a) argues that for the purpose of understanding and enlightening the current development of technology in schools, the focus of anti-essentialism is valuable for a number of reasons. The abandonment of an emphasis on 'impacts' and cause and effect, input-process-output-feedback sequences, allows greater flexibility in conceptualising technology and change. In particular it diverts focus from the trauma of impacts to the day to day decision making of teachers and administrators in the school environment and emphasises the multi-directional interaction of all groups affecting technological decisions, including the unseen work of financiers and marketers. From the historian's perspective a view that rather than emphasizing mechanistic metaphors of change, examines the ways in which human beings change technology (examining the social conflicts, compromises and failures of the whole technological enterprise) also has considerable strengths (Pannabecker, 1995, 2004).

Attributing complete interpretability to technology is criticised, however, for being equally constraining and reductionist. The social informatics scholar, Kling (1992) observed that such an approach naturally reflects 'interpretivist epistemologies and ontologies' and ignores more significant analysis and theory

on the social role of technology.   The technology as text theory has been further criticised by some British sociologists. Ascribing technology as completely 'open' to any reading by any person at any time has been likened to comparing a fruit machine to a telephone in communication process and as a mere form of social determinism where only social factors have influence (Hutchby 2001). However, although Rappert (2003) argues that such theory is theoretically primitive, he concedes that it does pose challenges to the academic community to develop explanations which can introduce social elements into the technical without the former predominating.

Social Shaping technology theories.   Theories which reject the assumption of universal systems but acknowledge alternate systems and models have been grouped under the umbrella term proposed by leading sociology scholars, MacKenzie and Wajcman (1985) as the social shaping of technology (SST). These studies focus generally on an exploration of the material consequences of varying technical choices. Some academics have argued they are more viable to education as they consider political, economic and cultural factors which pattern both the design and implementation of artefacts. Particularly relevant to the unforeseen consequence aspects of my research is the view, for example, that if technology is assumed not to emanate from a predetermined logic or single determinant, 'then innovation can be considered as a 'garden of forking paths' not only with different roots but also with different outcomes (Williams & Edge 1996). Such a concept can be useful in addressing and exploring the numerous unforeseen, unintended, unanticipated and often contradictory consequences of educational technology as discussed in much of the writing of education reform scholar, Fullan (1991, 2001). Wajcman (2008: 67) agrees that since digital technologies 'are conceived of as culturally and socially situated artefacts and systems, then there is nothing inevitable about the way they are evolved and used'. However, due to the extensive nature of literature in this field the following section restricts its review to two theories, particularly applicable to educational technology.

Actor-Network theory (ANT).   A theory developed within Science and Technology Studies and employed in a range of socio-technical systems but not used so extensively in education is (ANT) actor-network theory (e.g. Callon 1986; Law 1986; Latour, 1991).   Advocates cite key advantages for the theory in its attention to social factors and its holistic unit of analysis.   Unlike many other

theories for example, *ANT* assumes that social practice involves networks, consisting of things working together and that successful social practice is the result of 'heterogeneous engineering' whereby bits and pieces from the social, the technical, the conceptual and the textual are fitted together (Law1992: 280). Consequently, several education studies academics (Oliver 2011; Fenwick & Landri, 2012; Fenwick & Edwards 2010, 2012) and some network-learning scholars (e.g. Friesen 2009) recognise the key strengths in a theory which considers the network as a social achievement rather than making claims about decontextualized parts. The education academic and researcher into educational technology usage in Australian schools (and university), Bigum (1998, 2000) agrees that its avoidance of the social technical dualism and the boundaries implicit between the social and technical in education offers a valuable perspective on research. A particular strength, he suggests, is provide by employing the notion of heterogeneity which eliminates the human-artefact dichotomy entirely in order to emphasize an integrated and dynamic account of the mixed nature of socio-technical ensembles which is made up of *actants* with 'will' (people and things/non human such as technologies, materials, processes etc.) which receive equal weighting. He illustrates these ideas in an hypothesis which utilises an *ANT* perspective to explain the uptake of computers in schools via a more holistic reading of technology. In a theoretical narrative which claims 'a more realistic' reading of the internal political and economic power conflicts and networks within education, he identifies the significant role played by both human (innovators, teachers, departments, senior management, parents, public-state rivalry, private vendors) and non-human *actant*s such as the computer (whose 'self -interest' is care and dissemination) in the dynamic.

Criticisms of the theory, however, can be made on grounds of its failure to handle social equality issues and to account for pre-existing structures such as power (crucial in schooling, perceived as sites of ongoing power struggles) which are perceived to emerge from the actions of *actants* aligning in their pursuit of interest. Equally, for its overemphasis on design and most significantly for the attribution of 'will' or agency to inanimate objects. In *ANT* webs, the distinction between human and non-human is of little analytical importance, employing a conception of agency which presupposes intentionally as being neither located in human subjects or non-human objects, but in heterogeneous associations of humans and non humans. However, Bigum retorts (2008) that it does extend

scholarship in this area through identification of the complex relationships, alliance formation, conflict and negotiations that have located the computer in a large number of schools and presents the adoption of technology as a process of negotiation with both human and non-human stakeholders.

Alternately, some academics such as Waltz (2004) criticise previous discussion for giving insufficient credit to artefacts, viewing them as simply additive rather than constitutive, an approach which he considers *ANT* could address. The socio-cultural work of persons, he argues, has been privileged over the contributions of artefacts, obscuring the very practical ways in which persons and technologies codetermine, one another concluding that actor-network theory might serve to level the playing field and give artefacts a voice. Sørensen's (2007) exploration of the virtual learning environment in Danish primary schools (and its effects on teacher authority patterns) draws attention to the previous 'blindness towards how educational practice is affected by materials' (Sørensen, 2009: 2) which contribute to forming school practices as *participants*. In my preliminary research this is translated to some extent by participants foregrounding the technical in terms of its constraining significance by means of its persistent failure to function properly.

Further debate is centred on the limited nature of the theory's focus, for which Oliver (2011) retorts with an analysis of two basic alternative accounts of technology. By concentrating on *how* networks are formed and *sustained* (ways in which processes are engineered) for example rather than *why,* he notes that it successfully avoids the issue of technological determinism since there is no attempt to ask for a cause, only a description of what happened; what role it played in the success or failure of a particular social process. This is useful because while technology might not be said to 'cause' a social process, as Callon (1987) illustrates (e.g. contaminating catalysts' resistance to Renault's engineers attempts to develop an electric car), it can be blamed for its failure. Such an approach, he argues, usefully focuses 'on the way social processes are engineered' and describes technology in 'terms of the way it is constituted in, and helps to constitute practice' (Oliver, 2011:380). Other commentators such as Winner (1993), however, question both the worth and morality of the entire approach if it cannot pose the question of whether a particular technology caused a network, while Grint & Woolgar (1997) argue that such accounts still remain technicist.

Oliver (2013a) suggests that a second enlightening approach involves opening up the 'black box' of technology, namely examining those *actants* which are normally treated as stable and a matter of indifference when processes work, in order to explain them and to understand how they have been produced, why they play the role they do and why they failed (e.g. an examination of how technology affects the actions of others and how it is socially constituted. In his analysis of determinism in educational technology Oliver cites Enriquez's (2009) empirical research into the virtual learning environment, *Blackboard,* to further demonstrate its strengths. Her research is concerned neither with what works or *impacts,* but how it enacts multiple ways of working. *Blackboard* is perceived in these terms as 'no single, bounded thing but can be framed as multiple variants; a virtual environment, a tool, an approach' (Enriquez, 2009: 397). It also serves to demonstrate that although still 'rare', more empirical research, particularly into e-learning is drawing on this approach, emphasising technologies socially constructed character (e.g. Jones 2005; Ferreday & Hodgson 2008).

As Fenwick summarily cautions ANT should be viewed less like an applied theory and more like a sensibility, or as a way of drawing nearer to the phenomenon. As such its continual mutation offers new insights into the processes of education particularly through its broadening of the definition of what is considered *material*, from tools and objects to texts and discourses. Thus Stronach et al.'s (2002) empirical study of the manifestations of teacher performance systems and audit culture is particularly salutary to my investigation. For the latter draws attention to the often unanalysed, non-calculable (but mutually existing) elements of such networks which circulate in the same physical spaces as the calculable economies of performance. In this respect the significance of standards of caring, passion for work and professional collective values and solidarities which are practiced by the teachers in my research, despite defying the logic of human energy-based accountability measures or the 'ecology of practice', are seen as existing alongside the 'economy of performance' (Fenwick & Edwards, 2010:17). The multiplicity and interconnectedness of such factors, are of course effectively highlighted by the nature of the qualitative interview approach (see Methodology) which upholds the fundamental principle of human agency which is a core element of my investigation.

Social Construction of Technology (SCOT).   A second methodology from the field of Science and Technology Studies which has been credited as particularly useful (Selwyn 2012b) in understanding 'the competing interests, agendas and power formations that underlie uses of technology in education' (Oliver 2011: 381) is that of the social construction of technology (SCOT). He observes that in contrast to technological determinism where technology is positioned as a determinant of practice, in SCOT it is viewed, significantly, as a consequence.

Originating from enquiries into industrial innovation, the theory starts from the premise that the form and meaning of technology is socially shaped rather than being the clearly defined product of a particular innovator.   Research proceeds by identifying conflicts arising from a technology's design, exemplified by Pinch and Bijker's (1987) theory of *interpretive flexibility* (based on studies of the bicycle and Bakelite) which posits that the artefact has different meanings and interpretations for varied, relevant social groups (e.g. thrill-seeking young males, modest women or anti-cyclists in the case of the bicycle) who then connect meanings to the design features of the specific technology. The theory also identifies the point where socio-technological systems can be said to have reached 'closure', whereby the ability for alternative interpretations of a technology diminishes, often highlighting 'obduracy' (the fact that some devices are harder to alter than other), based on their materiality (Nye 2007).

Selwyn (2011a) argues that such a theoretical approach has several advantages. It can be used to explore the relative bearing of different social groups, including the pathways taken and how these influences relate to the social consequences of technology in situ, encouraging a more holistic approach which is perceived as more mutually shaping and shaped, in both an enabling and constraining fashion. In particular, it draws attention to the often unseen work of relevant groups such as designers, financiers, marketers, producers of technology, competing producers, journalists, politicians, users, non users and other groups, all of which have diverging interpretations of the technology in question, in crafting the materiality and interpretation of devices. It also serves to examine the nature of the incompatibility of business-designed technology for educational application and acts as a stimulus to debate about closure. For some social scientists technologies are perceived, on the contrary, as never completely 'closed' and such a theory can be adapted to explore how technologies actually

generate unintended consequences and unanticipated and often contradictory effects (as pertinent to my research).

Criticism, however, continues to focus on the social dimension of the theory. Even within the field differences of opinion are evident regarding the extent to which social as opposed to material factors should be weighted. Oliver (2011) compares, for example, Law's focus on environmental conditions in the design of trading vessels with Pinch and Bijker's cyclist preferences in their collected work (Bijker et al. 1987). Further criticism accuses the theory of avoiding technical determinism by simply substituting social determinism in explanation; a criticism equally levelled against Winner's (1986) explanation of New York Bridge design. Grint has argued that many of what he describes as 'socio technical systems' are really theories that unsuccessfully attempt to marry both technical and social forces and fail because they still retain assumptions about the nature and objective capacity of technology, thus remaining beyond the remit of sociological analysis. Since the root dichotomy remains intact, the two poles are merely separated in time: first social determinism, then technical determinism leading Grint to refer to such theories as inevitably 'technicist' (Grint & Woolgar 1997). Pinch (2010) retorts that both types of criticism miss the point since SCOT does not ignore the way technology influences people and their actions. It explores the politics of processes and both the intentionality and the 'forcing' of action by technology. Analyses based on the SCOT theory, however, still remain 'conspicuously absent' in studies of educational technology, 'visible only in passing in a few published works in the field (Cook 2007).

Conclusion

This examination of the literature has outlined the critical approach to the field of educational technology based on its under theorising of technology, its narrow focus and its adherence to technological determinism. It has situated the debate within the context of epistemological differences and the fundamental tensions between the social science and scientific domains within it. It further discussed potential alternative theoretical approaches developed in the field of Science and Technology Studies. Whilst acknowledging that some offer a more comprehensive analysis of the nature and extent of digital technology transformation in schools than traditional deterministic theory, it concludes their

unsuitability as a theoretical approach for my study. This evaluation is based on the inadequacy of the interpretation of human agency (and intentionality) and the partiality of explanation offered with respect to Actor-Network-Theory's concentration on social practice description over explanation, and the social construction of technology's focus on intentionality at the expense of technologies' shaping of practice.

Consequently, due to the limitations identified in specific theories, this research will employ a more general social-shaping approach as a means of understanding the phenomena holistically; at the micro (individual teacher, student, artifact), meso (institutional school structures, technological processes), and macro (cultural, societal, political and economic) levels of description and analysis, recognising the complex and interwoven connections which make up the site of educational technology use in secondary schools. Embedded in the latter issues are broader educational questions, however, about the nature and form of teaching, learning, pedagogy, epistemology and the nature of organisations, institutions and national governments. The following methodology chapter will explain how the theoretical analysis is to be integrated and operationalised at the practical, empirical research level.

Chapter 3

Methodology

Introduction

This chapter aims to position the research within a recognised methodology and to explain the research methods employed.

Firstly, I define and justify the qualitative methodological approach adopted and its underlying interpretative paradigm.

Secondly, I outline the research strategy which operationalizes my investigation by employing an adaption of Derek Layder's (1993) theory of social domains; a multi-dimensional research model of society which incorporates individual, interactional and contextual levels, all within an historical dimension. The latter thus accommodates my social-shaping, holistic approach to the research problem, as centred on heads of departments' relationship with educational technology in a manner which spans their whole career and is positioned within the broader context of societal and educational organisations. As Marshall (2010) recommends this provided both flexibility in the research design structure and an opportunity to link my research both to larger theoretical constructs of social theory concerning structure and agency and the national policy debate regarding the effects of digital technology on the secondary educational system.

Thirdly, I evaluate the methods utilised in the design for the purpose of data collection which consisted primarily of semi-structured interviews with middle managers in English senior schools, including basic participant demographics, and discuss how I accessed participants and the techniques used in data analysis.

Finally, as my research explored aspects of a personal nature with human subjects, I discuss ethical issues and due to my situation within the profession, I reflect on my subjective position and how it may have influenced the research process.

Qualitative research methodology

Personal Philosophy. My choice of research problem, its question objectives and methodology are based on issues of personal research philosophy and fitness for purpose. The way I proposed to uncover knowledge of social behaviour is primarily based on a research paradigm, which is underpinned by my philosophical assumptions regarding ontology (articulating the nature of the social world being investigated), epistemology (addressing the nature of knowledge; its nature, forms, acquisition and communication) and models of human behaviour. Employing Burrell and Morgan's (1997) analysis of basic research assumptions, I am more inclined to perceive social reality as a product of individual consciousness and cognition than as one which is external to individuals.   Since knowledge of the social world is more subjective and unique, rather than objective and tangible from this perspective, it naturally demands of the researcher, less of an observer role and more one of involvement with subjects who are perceived as initiators of their own actions, rather than as mechanical respondents to their environment.

Consequently, my methodological approach is selected from one which is more subjectivist and which views the world as a personal and a humanly created one.   I did not therefore attempt to analyse relationships and regularities between selected factors in the world; identifying and defining elements and discovering ways in which the relationship between them can be expressed in a predominantly quantitative format. Nor did I pursue a nomothetic approach which seeks underlying themes for the purpose of creating universal laws, which explain and govern what is observed. Instead my approach stressed the importance of the subjective experience in the creation of their social world.   My principal aim was to 'describe and understand complex situations' (Rubin & Rubin 2005: 21) and the way in which individuals create, modify and interpret the world in which they find themselves, and therefore my choice was logically restricted to qualitative methodology. My emphasis throughout the research was on understanding and explanation of the unique and particular individual case rather than the general and universal; the focus being on a subjective, relativistic, rather than absolutist external reality (Cohen & Manion 2011: 6). Ultimately, it was idiographic in its emphasis on the particular individual and its approach to understanding individual behaviour in a specific context.

Contextual background: personal.   Secondly, my research instrument selection is based on fitness for purpose and referencing Silverman's 'natural history' approach (2010) in methodology, I shall briefly outline the personal aspects of my investigation which justifies and explains its genesis.

My interest in digital technology and education developed during my early teaching career, initiated by a postgraduate educational studies course in 1982 in History and Geography (for the statuary required Postgraduate Certificate in Education for state employment), notably devoid of computer training. As with many of the interviewees' experience in this research my interest in technology application was wholly self-motivated, utilising the personal computer equipment available to individuals in the late 1980s. In my first state secondary school teaching post, computers (BBCs) were a rarity and confined to the generally male preserve of Design and Technology usage, and located in one small specialised 'lab'. Similarly, through my own initiative I wrote basic history programs for classroom use and demonstrated them on my own hardware, inspired by the potential access to historical sources that computers afforded. When the Department of Trade and Industry (as opposed to the Department for Education) publicised 'free' computer courses for teachers in the late 1980s, I applied and trained for an newly created Diploma in Information Technology which led to further and varied employment in my capacity as a teacher of IT, co-ordinator of ICT resources, promoter of computers to other teachers within Humanities and observer of state-based research projects ('Testbed Project'). Consequently, my personal teaching history and the multiple developmental stages of ICT throughout the period from 1982-2016 coincides. Thus, I am in the unique position of having lived through my research investigation topic; an experiential-based immersion which Kvale (2009) considers to be a significant research asset. Consequently, I have been a fascinated observer, as well as practitioner, during a period of major educational change. My natural historian's curiosity has been particularly stimulated, on the one hand, at the micro level of analysis by the varied human reactions (witnessed at first hand) and their adaptations to computer technology (an MSc in 2000 focusing on student and gendered activity), which I consider to have changed over time, with individual responses ranging from the enthusiastic to the fearful.   On the other, influenced by a Masters study in 'Management', together with head of department responsibilities and increased political awareness as a head of politics, I have reflected on developments at a

more macro level of analysis; particularly on the roles played by the media, the ICT industry (experienced in my capacity as a purchaser of equipment for schools) and the directional force of the state from the 1990s regarding its impact on the management of the educational organisations (private and public schools) and most significantly on my colleagues within the teaching profession. During this thirty-four year career I have been bemused by the marked difference between the portrayal of digital technology; its capabilities and consequences in research, the media and literature, and by my own experience of behaviours and events.

Consequently, it was to explain this discrepancy and to redress what had become, I perceived, a marginalised 'voiceless' teacher input and commentary on the issues, that research was primarily undertaken, with an explicit focus on the relationship of teachers, rather than students with ICT. Employing my understanding, insight and knowledge of secondary schools and heads of department served to naturally delineate the subjects' extensive scope and to facilitate the primary focus, as clearly expressed in my study's title.

Contextual background: general. Referencing the larger phenomenon of educational technology, a central question of my research pertained to understanding why the state (1979-2016), under administrations of varying political persuasions, initiated and sustained a highly expensive technology orientated programme of educational reform for four decades in the light of all apparent rationale evidence against it, namely the 'failure' to fulfil its ostensible purpose (based on the government's own criteria) of improving educational standards and economic growth (OECD, 2015).

As outlined in my introduction this problem generates further questions. Why after extensive investigation throughout the developed world, do the reasons for the ostensible inability of Information Communications Technology to transform teaching and learning as anticipated still remain unclear? And why have the significant, complex and often divisive effects of ICT (for I argue education in secondary schools is a site of conflict), within teaching, learning, the profession and the whole school organisation, arguably comparable to those of the Industrial Revolution, remain unacknowledged and unexplored?

Answers to the dichotomy can I suggest be explained partly due to limitations within previous research approaches which, using qualitative interviews, I sought to redress. 'Objectivity' of investigation for example, has been hindered; it is contended, by an intense (and unbalanced) dualism in debate

between a majority of its supporters and a minority of critics of educational technology.   On the one hand is a dominant discourse which presents technology in a utopian, beneficent and uncritical deterministic fashion, capable of solving all non-technological, social problems and on the other is a minority critical view of technology as essentially threatening and problematic

Limitations of previous research.   I would further argue that inconclusive evidence in this subject is also due to the dominance of deterministic assumptions in much previous research, which by its narrow focus, is far too limited to elicit meaningful findings in a phenomenon as complex as education because it misses the bigger picture (Selwyn 2011a; Oliver et al. 2006).   Lack of evidence, however, is not unique to the field of digital technology.   There is a long history of difficulty in proving the effectiveness of any educational innovations due to the difficulty of objectively measuring 'learning'.   Education is a complex phenomenon which occurs within a wider context of social conditions, arrangements and social relations, influenced by numerous social, cultural, economic and political variables which are very difficult to isolate and measure.

The application of quantitative techniques and statistical data, often utilised in some research is unsurprisingly inconclusive in terms of understanding the processes that are occurring in schools, or their meaning for either teachers or students.   Having utilised questionnaire style surveys and artificially conducted experiments in previous research (my case-study based in Bristol) into student learning with digital technology (Barker, 1999), I am aware of such limitations.

Furthermore, many investigations conducted in isolation of full historical, political, economic and social context produce findings which, I argue, can be misleading.   It is unsurprising that the application of quantitative techniques using statistical data to establish simple causal correlations between two variables, usually economic investment (ICT hardware) and educational outcome (attainment in national tests) is inconclusive in terms of understanding the processes that are occurring in schools, or their meaning for either teachers or students, nor is it expressed in a format which is readily understandable to either (Pelgrum and Pomp 1993; Underwood et al. 1999; Anderson & Ronnkvist 1999; Kozma 2003; Madden et al. 2005; Law et al., 2008).   It is only due to the apparent 'failure' of ICT infrastructure alone to deliver the desired educational outcomes that the focus of research has shifted to examine other factors that mediate or

moderate the relationship between ICT and student learning and to the significant role that *teachers* might play in the learning equation.

Much current research continues to focuses on teachers as the 'problem' to be solved. Working from the central premise that general ICT 'uptake' (defined narrowly by classroom usage, excluding lesson planning, preparation, reporting, dialogistic and assessment analysis) in schools by teachers has been slow, it proceeds to identify the factors which explain this in terms of a simple *inhibitors* and *enablers* format (Facer 2011). *Inhibiters,* (usually derived from questionnaire data) range in emphasis from inadequate in-service training, non-ICT pedagogical-based teacher training, lack of qualify software to the more crucial (in e-mature secondary schools) issues of technical support (e.g. broadband disconnectivity). However, assumptions that maximizing perceived enabling factors and minimizing inhibiters, through continued expenditure will produce different results or that teachers as experienced professionals simply require *time* to assimilate and adapt to the new technologies is based on a determinist view of human nature, with teachers acting as mechanical responders to the environment rather than as initiators of their own actions, a view to which, as previously emphasised, I consider to be inherently flawed.

Fitness for purpose & qualitative interviews & population. What is lacking in these basic explanations is an understanding of the issue from a *teachers' perspective,* as central to the delivery of learning, in secondary schools. Consequently, my research addressed the paucity of more in depth qualitative investigations into the 'impact' of ICT by focusing on the perceptions and experiences of a specific group of teachers and their experiences of educational technology on their working life, previously under-researched, yet well situated at centre of the school organisation to provide an insight into the phenomenon; namely *the middle management sector of heads of department*.

The choice of subject heads of departments for central investigation was particularly relevant not only because they represented a group previously neglected by qualitative research in this field (Selwyn 2002), but because they also play a crucial role in the delivery of the academic curriculum as leaders, decision makers, key communicators between teachers and senior management, strategic planners and policy implementers, staff (teachers, NQTs,) and resource (including budgets) managers and as subject experts and agents of change. As middle managers they are in a key position to evaluate changes in organisational

structures and to comment on the changing relationship between senior and lower level staff. It was anticipated that their insight, experience, evaluative and review capacities (due to age and experience in some cases) would inform the current research with the added historical perspective, lacking in previous studies, in addition to offering comparative opportunities via the recording of pre-ICT teaching, together with the experience of more recently appointed and/or younger heads of department. Focus on this group had the advantage of maximising efficient access to a considerable diversity of the research population, in terms of subject area responsibility, age, gender and ethnicity. Additionally, the professional status of the position, normally acquired through progress and experience of multiple roles (e.g. post-graduate student teacher, newly qualified teacher, senior teacher etc.) with some enacted simultaneously with senior positions (e.g. deputies or head teachers) offered additional multiple perspectives on the institutions hierarchical structures, processes and practices.

Specifically the focus was on exploring to what extent ICT had changed the work and role of heads of department, the relationships with colleagues and the school organisational structure in which they worked. Additionally it investigated responses to 'innovation', the factors that restricted or facilitated ICT implementation and the consequences in human and physical terms for subject and pastoral departments.

Since the study addressed the human problem of how the relationship between new technologies and secondary school teachers had developed over time, building a complex holistic picture formed with words and reporting the detailed views of the informants, the principal interview instrument for data collection having direct bearing on the research objectives was specifically *semi–structured interviews,* with approximately fourty heads of department (from all subject departments, including ICT) supplemented by five key informant interviews as appropriate.

Holistic View of society

Although several scholars of social theory have argued for the need to recognise the different layers of structural, organisational or embodied levels of analysis in a proper understanding of society, they conceptualise the multi-layered nature of society differently and much sociological thought continues to be characterised by the three key dualisms of agency-structure, individual-society and macro-micro (Layder 2006).   Layder's philosophical interpretation and social model, however, provided both a sound intellectual basis and accessible framework for the operationalisation of my holistic research approach.   On the one hand, he offers a comprehensive critique of the variants of contemporary social theories, envisaging dualisms as separate entities (competing for relative dominance) and of structural theories whereby human agency is subsumed to systemic features as with Marxism & Althuser (1969) together with phenomenology (Schutz 1972) and symbolic interactionism (Mead 1967; Blumer 1969) which prioritise the role of social interaction in meaning creation at the expense of acknowledging influences of social structures, independent of the individual.   Nor, does he accept that the social universe is conceptualised solely in terms of mutually dualistic models (e.g. Giddens 1987) which purport structure and agency as mutually constituted, rather than separate and hence flattened out into a single dimension (Layder 2006). On the other hand, he does argue that the entities referred to in sociological dualism do possess their own characteristics, and while not antagonistic or subsumed into each other, are interlocked, interdependent and mutually influencing of each other. His emphasis on the importance of interrelationship between both structure and agency in understanding the complexities of society has sufficient 'ontological depth' for my research.

Moreover, his multi-dimensional model of the social world (**Figure 1**), utilising four social orders of inter-connected, overlapping domains (*psychobiography*, *situated activity*, *social settings* and *contextual resources*), designed to facilitate analysis of structural features and agency also recognises the significance of their variation over time, an element crucial to my investigation.

Figure 1: Layder's Outline Research Map

Research element	Research focus
CONTEXT	Macro social forms (e.g. class, gender, ethnic relations)
SETTING	Immediate environment of social activity (schools, family, factory)
SITUATED ACTIVITY	Dynamics of face-to-face interaction
SELF	Biographical experience and social involvements

HISTORY (vertical label along left side)
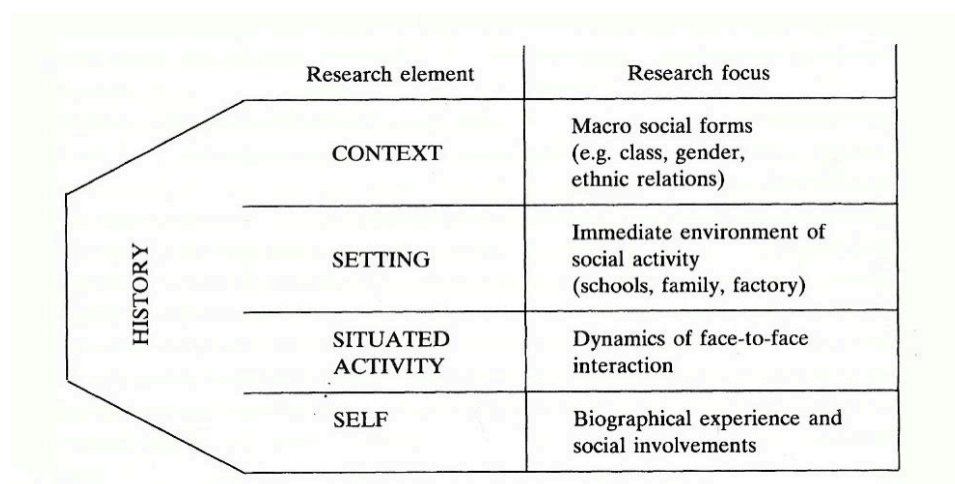
(Research map: an outline. Layder, D. 1993, *New Strategies in Social Research*, 1993: 8, Polity Press.)

In this model *context* is perceived as the encompassing domain of unequally distributed material resources (class, gender, ethnicity) and cultural resources (knowledge, media representations, norms and styles) which provide the socio-economic, political and cultural context of social settings, thus simultaneously effecting social activities and human being's inner lives. *Setting* is the immediate environment of *situated activity* constituting ongoing formal (e.g. school organisation) or informal patterned relationships (family) networks. *Situated activity* represents a unique analytical layer and one which facilitates a clear focus on the dynamics of departmental interactions. Both are characterised as episodic social encounters which can be fleeting or of lengthy duration and the *self or psychobiographical* domain concerns the individual's unique experiences, the attitudes, ideas, values and dispositions with which they manage their personal and social lives and their career trajectory through time and space (Layder 2006: 274).

Finally, the *historical dimension* through which all other elements move, (often ignored in research models), supplementing and complementing analysis is given central importance and characterised in three main ways. By reference to the orthodox employment of historical antecedents of any social phenomenon, distinguished as impersonal 'historical forces that promote specific kinds of processes (institutional, structural) of social change', as the 'flux and dynamics

that characterise everyday routine' interaction) and in terms of each element having different time scales and their own distinctive emphasis in relation to time' (Layder 1993: 175).

Layer's four elements of social orders are paralleled to some extent in Kozma's (2003) conceptual 'framework' for specifically understanding and explaining technology and educational change in schools, in terms of the range (by no means definitive) of analytical factors of interests and influences.

Firstly, at the micro-level of analysis he identifies factors related to the teacher and student, including educational background, experience of technology, norms and socio-economic backgrounds, classroom and technology device logistics and organisation. Secondly, at the meso level, human beings (school and business leaders, managers, parents and local educational authorities, school governors and school boards) and issues of school type, organisation, local culture and unique history of technology innovation and support structures are discussed. Finally, at the macro level, political and economic factors including the influence of national educational policy, business and ICT industry interests, national curriculum, educational funding, and economic and cultural forces are raised.

Since both models are designed as flexible tools to the research any social question, I will employ an adapted version (**Figure 2**) of Layder's strategy, bringing certain elements to the fore; emphasising characteristics within layers and discarding others as appropriate, with the distinctive characteristics of social layers being informed by Kozma and the social-shaping perspectives of educational technology (as outlined in Chapter 2) in order to link social theory to my empirical research, as now discussed.

Figure 2: Research model showing holistic levels of analysis

MACRO SOCIAL FORMS **Societal:** values, cultural norms, traditions, media discourses **Economic:** ICT industry, commercial organisations, business leaders, economic climate, economic ideologies **Political**: dominant ideologies, political funding, state educational policies & goals, educational legislation, public examination systems, agendas of individual politicians	**MACRO/** *CONTEXT* **LEVEL**	**H**
IMMEDIATE ORGANISATIONAL ENVIROMENT **Institutional Type:** school, college, state, academy, independent, grammar, church aided. **Location:** urban, rural, regional interests **Workplace culture & practices:** leadership style, internal authority structures, bureaucracy, culture & traditions, power relations, staff development & external links e.g. local education authority support structures **Key Actors:** head teachers & equivalents, senior management, governors, parents, business associates. **ICT Infrastructure**: type, co-ordinator, technical support, innovation history & culture	**MESO/** *SETTING* **LEVEL**	**I** **S**
DYNAMICS OF FACE TO FACE INTERACTION **Departmental interactions:** face to face relationships with colleagues, senior management, NQTs and students, internal communications, classroom factors, sub-cultures, inter-department relationships, ICT support & interactions **Departmental ICT based equipment:** organisation of facilities, experience of use, artefacts & digital processes for teaching, administration & management purposes	*SITUATED* *ACTIVITY*	**T** **O**
BIOGRAPHICAL EXPERIENCE **Individual departmental head:** personal educational and teaching background, experience, educational technology history, subject area, pastoral perspectives, domestic circumstances, personal biography and dispositions	**MICRO/** *SELF* **LEVEL**	**R** **Y**

(Adaptation of macro, meso & micro levels of analysis from Kozma's 'conceptual framework' (2003: 11) with Layder's 'research map' (1993: 72), delineating *context, setting, situated activity & self* domains with *time* intersecting multiple levels.)

Theory and empirical research relationship

The premise of Layder's research strategy for investigating social questions based on the concept of combining empirical research and theory building in a continual process, accommodated the exploratory nature of my research to the extent that the heads of department and educational technology had received limited research attention; certainly from an holistic perspective. Consequently, the aim of my study was twofold; to complement established ideas, concentrate on the discovery of new findings and to represent new ways of thinking about the subject (Layder 1993).

Although Layder acknowledges the traditional grounded theory approach of Glaser and Strauss (1967) which promotes the emergence of theory from empirical data, in contrast to the testing of pre-existing hypothesis on data, he considers it restrictive by virtue of its single domain (inter-subjective phenomena or *situated activity*) focus and emphasises that elements of general theory need to be incorporated into the former in order to ground its analysis in broader societal structural and power relationships. This is founded on an ontological position, which I share, which is critical of the over-focus on 'close up' features of social interaction at the expense of macro factors of influence, (including omissions of historical context) which can only be identified by careful acknowledgement of these issues of setting and context.

Therefore, I employed an adapted version of Layder's research framework, to conceptualise the social reality that pertained to my study. This research map proved helpful in both the design process and throughout the fieldwork and analytical processes, including the development of emergent theory (Layder:1993: 73). The design facilitated the precision of research questions and aided clarity of focus with further exploratory research analysis and theory building, by rendering more 'visible' the mutual interlinkage of the differing layers of social action on the research phenomenon. Although the overlapping nature of the various analytical elements in Layder's research map (**Figure 1**) are emphasised, he does argue that they are sufficiently distinctive to be identified and examined separately for analytical purposes and I incorporated features from Kozma's 'framework', to further inform my analysis of the distinctive characteristics of these interdependent layers from an educational technology perspective. However, my design emphasises the central assumption that

'structural features are inextricably interlocked with social activities and that we cannot understand the one without the other' (Layder 1993: 56).

Since the central subject focus of the investigation was middle management (heads of department) and their relationship with educational technology, the micro level of *self* was given primacy in my study with semi-structured interviews, with participants constituting the main source of primary data. The circumstances in which departmental heads work and the personal qualities, attitudes, motivations, education and personality which influence their initial choice of, and experience within, a service occupation, render unique biography, self-identity and experience a crucial dimension of the investigation. Layder emphasises the link between social experience and the individual's social world, and it is their perception of technology which was central to my research and was highlighted throughout the interview process (Layder 1993: 74). Focus on this dimension and how the individual related to educational technology; 'the lived' experience (of negotiation, unpredictability) in practice (Selwyn 2011a), raised issues of the significance of the role of agency and human adaptability in educational technology and questions around responses to, and influences on (including creative adaptation of), technology, counterbalancing more social constructivist and deterministic interpretations of phenomenon as discussed in Chapter 2.

All aspects of the middle manager's professional working life, revolves, however, around human relationships which is expressed in Layder's element of *situated activity*. The emphasis here is not entirely on the individual's response to various social situations but to the *dynamics* of the interaction. For in their teaching role an experience of '*self*' is intermeshed with their interactions with a variety of individuals (students, colleagues, senior management, parents) in which they play different roles, (authority, counsellor, inferior, servant), situated in varying locations (classroom, lecture theatre, shared study, manager's office) and are subject to varying power and control strategies (including variations of different degrees of self-control and composure) in consequence. In addition, their work also involves considerable routine and ritual and once interaction occurs in recurrent interactions, this spatial spread is equally as important as the activity itself (Layder 1993: 87).

In my research this process is particularly relevant to departmental activities and raises questions as to what occurs to the dynamics, when

educational technology influences group dynamics, in addition to becoming a new intermediary in general communication and the educational process itself. What happens, as expressed by Gidden's (1984) concept of 'strategic activity' to the social skills and knowledge guidelines that govern behaviour when, for example, normal face-to face communication is replaced by email? Or, the power dynamics (team, hierarchical) of the heads of department's traditional mentoring and authority role, if newly qualified teachers and students display what may be perceived as more valuable technical skills? These issues and their relationship with a sense of self and identity are discussed in Chapter 4.

After a certain juncture Layder argues that it is impossible to keep questions of situated activity separate from the place in which they occur. Organisations, institutions and the local aggregations of *reproduced (*by the past through time, habit and tradition) social relations, positions and practices, embodying structural aspects of social life (Layder 2006: 280) and including the individual's background family and leisured sphere, consequently compose his next level of analysis; *setting*. The latter translates in my research to an exploration at the meso or occupational setting level of analysis of the educational technology phenomenon at the school or college organisational level; encompassing its relationship with local organisational culture (and departmental sub cultures), structure and the various power relationships exhibited in the workplace (exhibited formally or informally), including behavioural norms linked with the profession's status and the expectations of parents, students and senior management. This dimension raises issues concerning influences on management style (authoritarian and consensual), issues of control, constraint and surveillance (Giddens 1990; Lyon 1988, 2006) and influences on bureaucracy and hierarchical versus flatter more democratic organisational structures. Additionally, by raising issues of *social production*; whereby social forms are never considered static but evolving with *social reproduction*, in which social forms are replicated and sustained by habits, traditions, rules and stock knowledge (Layder1993: 91), it accommodates an analysis regarding long held questions seeking to explain the perceived endurance of continuity over change within school organisations as discussed in Chapter 5.

Both the level of *setting* and *context* aided my research objective in informing the problems of the relationship between structure and agency inherent in a discussion of the relationship between humans and technology as raised in

Chapter 2. Layder emphasises that the applicability or distance (relevance) of macro factors is as, or more important in understanding their relationship to the phenomenon investigated, than issues of size or scale (macro-micro). My research findings did suggest that class, ethnicity, and to some extent, gender (micro/self) were deemed less significant than the economic and political factors (and dominant ideologies) involved in the large scale society-wide (macro/context) distribution of resources (goods, services, status, authority, gender and power). Certainly for many departmental heads the political and economic dimensions of ICT and educational organisations, including examination boards, governmental policy and central financing proved paramount. An analysis of the wider cultural factors of *context*, mirrored by the media and including general societal values and norms, were also central to the understanding of the operation of educational technology in schools. The latter included perceptions of technology and the educational institutions, together with those unique to the teaching profession as a subsector with its own (sometimes conflicting) codes of behaviour and value systems. This dimension helped to address and explain questions of creativity and constraint in the working lives of middle managers, the changing role of professional work and the dynamics of various and often conflicting power sources in (driving and curtailing) educational innovation. For example, issues regarding the shaping of technology and the framing of technology by educational administrations and the influence of commercial and private interests are addressed.

Although the research elements of *self, situated activity, setting* and *context* are designed to reflect the continually overlapping nature of social processes, the intentional flexibility of the research map facilitated my ability to focus 'selectively' and to give differing analytical emphasis to certain elements which were of particular importance, enabling attention to be concentrated on certain areas while others remain more in the background.

This flexibility in focus and emphasis further aided my research by its accommodation of an important historical dimension, via its recognition of the temporal dimension though which all the other elements move', with each element having different time scales and 'their own distinctive emphasis in relation to time' (Layder 1993: 101). Layder recognises that this is normally thought of in terms of the macro (*setting* and *context*) level, whereby processes of change in power and domination can have different emphases, which translates in

my research to an exploration of the varying degrees of influence governmental legislation and economic and technological development has upon the phenomenon within the macro historical context (as referenced in Chapter 6). My research, however, envisaged the latter process as intertwining at all levels, including *self* and *situated activity*, since the study is intentionally designed to focus not solely on a single moment in time, but to incorporate elements of a longitudinal nature. A process facilitated by its primary focus on the middle managing heads of department's whole career, some of whose working life naturally coincided with both the initialisation of the phenomenon in the 1980s and its development to the current day, whilst other participants were positioned (by virtue of demographics) at different stages or intervals (with differing perspectives) along an historical continuum of educational technology development from the 1980s to 2016. The insights, perceptions, judgments and experiences of participants as explored in interviews were thus central to the study's analysis.

Research Design

Following Layder's (1993) proposition that social activity and structural features are interwoven and cannot be comprehended in isolation and Selwyn's (2011a) contention that the nature of digital technology transformation in schools is only understood from an holistic, 'social shaping' perspective, I adopted a qualitative research approach which explored the head of department's working life and their relationship with educational technology within its broader structural and contextual dimensions, including an historical perspective, within which those experiences are embedded.

Moreover, although Layder's strategy suggested a multi and mixed-strategy approach, so as to interweave macro and micro elements for analysis, I chose to employ qualitative methods to achieve my research objectives. I primarily gathered generated data from semi-structured (whole career) and key informant interviews, supplemented with the naturally-occurring data obtained during interview observation (Ritchie 2003) and the analysis of contextualising (but not necessarily authenticating) secondary documentation. Whilst cognisant of alternative approaches to an understanding of the social world and not wishing to imply that there is only one true social reality (which the researcher accesses

via the appropriate methods of measurement and description), I defered to Blaikie's (1991) argument that it is inappropriate to combine methods founded on different epistemological and ontological assumptions. Consequently, I considered a mixed method approach could materialise into sometime of a 'hotch potch', with no underlying rationale to justify its choice of methods (Arksey & Knight 1999: 24).

Figure 3 below sets out my research questions and the primary methods used to gather empirical data, relating each to Layder's interconnected research elements, the specific factors of which have incorporated traditional micro, meso and macro factors pertaining to education, as identified in Kozma's (2003) 'conceptual framework'. This framework was utilised in a provisional way and as Layder suggested although not 'subsequently dispensed with', was certainly adapted as the research developed its own theoretical momentum and theory emerged.

Empirical data was collected using the following methods:

- Semi-structured interviews, conducted between May 2014 and June 2016 with departmental heads in UK secondary schools and colleges of FE.

- Interviews with key informants conducted over a period between May 2014 and May 2016.

- Observational, naturally occurring data during face-to-face interviews.

- Secondary policy documentation and literature.

Figure 3 Research questions

Research Question	Key Method	Layder's Research Element	
1.How has ICT changed the work and role of a head of department?	Literature review Head of Department interviews	SELF	*H*
2.How have departmental heads responded to ICT innovation over time?	Literature review Head of Department Interviews	SITUATED ACTIVITY & SELF	*I* *S*
3.What have been the human and physical consequences for academic and pastoral departments of ICT innovation?	Literature review Head of Department interviews Key/informant interviews	SELF & SITUATED ACTIVITY	*T*
4. How has ICT influenced the whole school organisational structure and management relationships?	Literature review Head of Department Interviews Key/informant interviews	SETTING	*0*
5.What factors have restricted and facilitated departmental ICT implementation?	Literature review Head of Department Interviews Key/informant interviews	CONTEXT SETTING	*R* Y

Qualitative Interviews. Since the key determining factor of a methodological tool is fitness for purpose and my research sought to acquire a comprehensive understanding of the experiences and attitudes of heads of department with respect to educational technology (over a career), I used interviews as my main data collection tool. Although there are several types of qualitative interview, I employed a semi-structured format which as the term implies combined features of both structured and unstructured interviews,

balancing an element of consistency and pre-planning in the specific topics investigated with considerable freedom in the respondent's reply and direction.

In addition to the advantages of flexibility and interactivity (Legard et al. 2003), my aim was to develop the depth of understanding the research questions sought, specifically how technology had affected the participants' professional lives, their departments and the institutions in which they worked. Rather than generalising from the data collected, my focus was on capturing the uniqueness, quality and complexity of situations and an understanding from respondent's perspectives (Morrison 1993). The later included eliciting a wide range of issues of a personal nature including motivation, attitude towards education, technology and 'innovation', subjective observation and judgements, inter-personal relationships with colleagues and personal strategies for coping with technology, work-home life interactions and responses to change and innovation.

The more structured element of the instrument involved the design of an interview guide (**Appendix 3**), with a series of pre-planned core questions on generally specific topics (ICT, teaching, administration, management) to be covered by all respondents, facilitating a degree of consistency and setting the parameters of the research topic focus, but subject to review after recommended piloting with five contacts working in the educational sector (Anderson 1998; Brown & Dowling 1998). In the light of these interviews amendments were made to broaden the themes and to employ more precise wording, which was initially considered too generalised (while retaining the context of continuity and change, creativity and constraint, help and hindrance). The guide structure was subsequently improved in the light of experience to better accommodate an accessible exploration of the respondent's whole career experiences with interviewees usually preferring to answer questions within a self-imposed chronological narrative.

In order to offer the freedom necessary to achieve insight into the way in which individuals viewed their social world and to avoid closing off alternative avenues of enquiry that could arise from my preconceptions (Bryman 2008), the interview was conducted in a manner which maximised its responsive elements. The provision of sufficient time (minimum of one hour) was crucial in allowing the interviewees to deviate from the guide and many discussed at length their personal priorities (e.g. poor training, examination cheating, inadequate equipment, ignorant senior managers,), allowing what was clearly meaningful to a

each individual to become salient and in so doing, also raising their satisfaction levels (and willingness to recommend other colleagues for interview). The latter also facilitated the variation of questioning and focus necessitated for individuals who had usually undertaken a multiplicity of job roles during their working career (as student, newly-qualified teacher/NQT, head of department, head of year, deputy head, principal or head teacher for example). The subsequent flexibility in wording, question sequence, deviation, asking of supplementary and follow up questions, ensured that different interviewee preferences were accommodated, with some progressing along the lines of a conversation (or near monologue) with little input from myself, whilst others adopted a more rapid and specific question and answer format.

However, as Cohen (2011) emphasised all interviews necessitated a constant need for active listening. I needed to be highly alert to what was being said throughout each interview in order to pursue interesting material via prompting and probing, (Brown 1998) with reminiscence of experiences, for example, providing an effective aide de memoire, whilst also pressing for clarity and elucidation, rephrasing and summarising where necessary, checking for confirmation where issues were vague (Cohen, 2011:415) and when appropriate drawing attention to the respondent's inconsistencies (Bryman 2008: 451).

The research group. Since the emphasis in my research was on the uniqueness of the individual or group of middle managers and the phenomenon of their relationship with educational technology, to describe population sampling in terms as normally applied to quantitative methods is problematic, and as Cohen (2011) suggests unfitting. 'Purposive sampling' was generally used to selective the participants for the specific purpose of my research (Teddlie & Yu 2007). When I was in a position to reject (usually non UK participants) or select volunteers directly (as when accessed from a variety of social networks), I hand-picked the cases to be included based on my judgement of their possession of the particular characteristics sought at the relevant stage of research, such as professional role, subject area expertise (Ball 1990), with middle managers initially targeted, followed by senior managers and newly qualified teachers (NQTs) and to supplement perceived gaps in research as the analysis progressed. Although a similar approach was used regarding more indirect access via the institutions (e.g. senior schools and colleges), whereby I could specify preferred access to key roles e.g. ICT co-ordinator or pastoral heads etc., the final choice of

specific individual rested with the intermediary or gatekeeper. I verbally encouraged chain referral (with informants identifying others who might qualify for inclusion) throughout all stages of the interviewing process and some limited up-take resulted. Based on the assumption that all participants were volunteers, and that gatekeepers were subjective, I recognised various motivational biases, which were accommodated into the research design, with reassurance often given to interviewees, that their subjective perspective was explicitly valued. Although in consequence the interviewees were not representative of a wider population group, my primary concern was not to add breath to the study or to generalise but 'to acquire in-depth information from those who could give it' (Cohen, 2011: 157).

I conducted a total of fourty interviews with senior school heads of department (academic and pastoral) between May 2014 and June 2016 of which approximately a third held additional professional responsibilities as deputy heads, head teachers, pastoral heads of year and educational ICT consultants and all had experienced post-graduate teacher training, newly qualified teacher status and teaching in a range of schools and colleges in various geographical locations throughout the UK during their professional career. To ask for personal data in the form of a questionnaire was, I considered, detrimental to take up (time-consuming and intrusive) and consequently, I obtained basic demographic characteristics of the interviews through observation and where provided voluntarily as part of the interview process. **Appendix 2** details the interviewees, using pseudonyms and numerical codes to ensure anonymity and confidentiality. I conducted interviews averaging one hour in duration in three formats according to the interviewees' preference, (based on ease of accessibility and time), but all in locations which permitted audio-recording. The latter included, face-to-face interviews, in the participants' workplace, normally a school (empty classroom or laboratory) or in a neutral location which included a university office or private members' club room in London locations; via telephone or the internet (using Skype), both conducted in the researcher's study with access to participants based in other locations within the English Counties. I personally recorded and transcribed verbatim all interviews which ceased when I considered I had sufficient data upon which to base the analysis of my research questions.

Key informant interviews. Additional key informant interviews (trades union official, chief examiner, government ICT advisor, newly qualified teacher and management and technology academic) were utilised to provide data at the setting and context levels on organisational context and political and economic policy context. These interviews served to compliment the academic literature reviewed in the study, enhancing the perspectives gained from interviews with middle managers, providing a deeper understanding of the extended social relations that shape their everyday experience and offering insight into, and evaluation of, the effectiveness of past and contemporary legislation, directives and policies with respect to the implementation of educational technology in schools. Additionally, some key informant interviewees were 'gatekeepers', particularly in the capacity of head teachers who provided the necessary access routes to the middle management research participants. A flexible interview schedule was devised with core themes, (**Appendix 3**) which I adapted for each interview to suit their personal, organisational and situational experience.

Information from secondary sources. I complimented the data derived from qualitative interviewing with a range of information from secondary and primary historical sources used for contextualised purposes. The former included information from educational institutional websites, government departments (Department for Skills and Industry etc.), professional organisations (National Union of Teachers) and the latter, archival material on the Thatcher and Blair governments from Churchill College Cambridge, The National Archives at Kew and microfiche of the Times Educational Supplement (1980s-1990s), held in the Institute for Education, London and the British Library to inform the phenomenon's positioning within its broader cultural discourse.

Access to participants. Access to teachers by researchers has become increasingly challenging due to issues of severe time poverty related to contemporary employment. As a head of department myself I was forewarned that my fellow professionals would be reluctant to spare precious resources for the interview process, as I similarly ignored communication (in any format) which demanded additional time and energy commitments. Two main strategies were consequently employed to circumvent theses challenges; preliminary contact via the institution at the start of fieldwork and when the response rate dropped, via individual approaches and social networks thereafter.

I concentrated my initial focus on educational institutions in the Greater London area, primarily for reasons of easy and affordable travel access from my research base at Queen Mary University, London.   Lists of all secondary schools in England were available from the Department for Education database, 'Information Britain' website and independent schools associations.   Preliminary background information on schools was also accessed via the 'School Guide UK' and League Table listings on the Guardian, Times and Telegraph websites. Once a school was identified, further information was obtained from its own website, which in addition to location details articulated its mission statement and gave a flavour of its ethos, indicating whether it prioritised ICT or research interests; factors which might render it more amenable to investigative access, which proved correct. (Schools in 'special measures' for example would be highly unlikely to be receptive to external interview requests). I further collated and categorised London schools in order to obtain responses equally across each borough, which proved unrealistic.

Although information was publically available from individual school and college websites (providing personal name identification, school address, personal email address etc.) which enabled me to contact (some named) departmental heads directly by personalised written letter or email request, the ensuing respondent rates by this direct targeting was low.

Consequently, I utilised personal knowledge and insight into school cultural practices, procedures and norms, particularly with respect to external demands and issues of staff privacy to adapt the strategy. Subsequently, heads of department were accessed indirectly and formally through their institutions traditional gatekeepers; head teachers and equivalents, who if particularly interested by the research in terms of cost benefit analysis, had the requisite power and resources to organise and facilitate the interview process. An assessment that was fully realised. Hence a summary report was additionally offered (in an exploratory letter) on completion of the research which was also widely accepted. Although the initial intention had been to target institutions in order to reflect diversity in type (state, independent, free, Academy etc.) and region (although inessential to the research design) these became secondary to the pragmatic issues of response rates. Selected institutional websites were fully explored in order to obtain contact addresses for head teachers, to which printed letters inviting (and

outlining) research participation (**Appendices 4-6**) were addressed and revisited for further contextual detail if access was granted.

A telephone conversation with head teachers and co-ordinators was invariably a second stage in the access negotiation, whereby my research was clarified and elaborated, as usually requested (in a vetting process) and logistical details discussed.   A crucial element in successfully obtaining interviews was related to their positioning within the academic school year. Busy periods, mid-term and pre-examination periods were unacceptable and access was only possible during relatively 'quiet periods', at the immediate start of term (e.g. INSET time), post holidays when staff were refreshed or at the end of terms when staff were too exhausted to undertake other productive work.   This development meant that the fieldwork extended over a period of two years, rather than the one initially envisioned. An additional advantage of the strategy was that it provided an opportunity to access key informant participants such as head teachers, vice principals, deputies etc. in addition to securing a small number of interviews contacted via the 'snowballing' process from participants who had been contacted in the routes outlined. A clear disadvantage, however, was the mediation of the gatekeeper in the selection process of participants. Although I envisaged that the participants thus selected would exhibit a marked bias in favour of educational technology, this did not prove to be the case. This strategy also facilitated opportunistic observations of participants, interviewed in situ, in school classrooms, school offices and laboratories rooms or via university interview rooms and the researcher's London club facilities.

Once the response rate from institutions dropped off, a second series of interviews with middle managers, newly qualified and senior teachers, public examiners, trades union representatives, educational consultants and educational technology academics were accessed more directly via personal (my public examining board contacts with OCR and Edexcel) or professional associations and network systems, including UK university education departments and 'The Miranda Net Fellowship', (a non-profit making professional organisation of ICT policy makes, teachers, advisers, teacher educator, researchers and commercial developers). Such interviewees were distributed throughout the UK and in consequence, interviewees often preferred to be conducted via phone or the Internet; a facility which contributed to high take up levels with the participants responding voluntarily and independently of intermediaries.

Although these methods of access clearly effected, in terms of strengths and weaknesses the 'sample' of participants obtained, (possibly assuming a favourable bias towards educational technology) my qualitative methodology did not require the sample to be representative and it achieved the diversity in range and differencing and relevant perspectives (Arksey and Knight 1999) than my analysis required.

Data Analysis

As recommended by Saunders et al. (2003) the analysis of data occurred in several phases. The latter was initially organised in a manner which ensured that it reflected the participants' definitions of the situation, via allocation of units of original data to appropriate categories (e.g. ICT development and teaching, administration, management, continuity, change, creativity, constraint, organisational structures). This process was followed by an identification of the salient relationships within, and between these categories and the development of themes with the aim of producing well-grounded conclusions. Although scholarly consensus recognises that qualitative data analysis is often approached from a perspective of grounded theory, I concurred with Cohen's, (2011: 537) assessment that there is 'no one single or correct' method of analysis and consequently adopted procedures based on issues of *fitness for purpose*. The identification of themes began at an early stage in the research process as recommended (Spencer et al. 2003; Silverman 2010) supporting Layder's (1998) caution regarding the challenges resultant in commencing data analysis from a blank slate perspective. As he suggested, I employed (unconsciously or intentionally) interpretations which were clearly theory laden from concepts derived from the literature review and issues which had emerged from the analysis of secondary documentation (e.g. institutions' websites and 1980s governmental records). I used such 'sensitising' concepts for orientation in the early stages of research and found them to be useful aids in organising my interview schedule (**Appendix 3**) thematically around issues of continuity and change; constraint and creativity, and structure and agency with respect to educational technology.

The second stage was commensurate with the interview process itself. All interviews were of at least one hour's duration and audio recorded with the participants' permission. Since the recording device was hands free I was able to

simultaneously write down memos of what themes were being discussed, what elements were new and often required further exploratory questioning and any opportunistic environmental observations (e.g. what technical equipment the interviewee possessed, the technical layout of classrooms, offices, staffrooms and the facilities of the organisation itself as evident in reception procedures). The latter process was crucial for orientation throughout the interview.

Field-notes, summaries of salient features, reflections and thoughts were also recorded preceding, immediately after each interview and during the (full) transcription process (facilitated by 6-8 hours duration), in a constant on-going process of analysis, whereby I noted patterns, regularities and themes, (including omissions) derived from the interviews in what Hammersley (1995) refers to as the theory building cyclical process. As Gibbs (2007) predicted, my analysis of qualitative data was both heavy on interpretation and involved the merging of data selection with analysis in an iterative, back and forth process (Teddlie & Tashakkori, 2009: 251) often with the results of my analysis in memos and notes constituting data in their own right which was employed in later, further analyses.

Due to the relatively small number of transcripts (fourty-five in total, plus five pilot scripts) involved, as Cresswell (1994) recommends, I was able to continually read and re-read the full transcriptions throughout the analytical period. I employed a constant comparison technique (after Glaser and Strauss, 1967) which ensured thorough familiarisation with the data and facilitated the emergence of common themes through the mind's natural sifting and revisiting process, without, I considered, the loss of overall context which was crucial to my holistic understanding.

The third stage involved importing the transcripts into the qualitative analytical software package, NVivo where they were coded via nodes which were based on a combination of the sensitising concepts derived from prior theory as discussed (e.g. creativity, conservatism) and the open concepts (e.g. bureaucracy, neo-liberalism) which emerged from the data (Corbin and Strauss, 2008). Indeed, new themes which emerged from the interview data, required an expansion of my literature review to incorporate issues which were highlighted by participants with respect to ICT-expanded bureaucracy and the impact of 'new managerialism'. Thus, continual adjustment occurred with the over or under emphasis of issues initially identified by the literature and confirmed or minimised in the light of participant responses. NVivo's Memo and Journal

functions aided Layder's recommended approach of utilising theoretical memos to formulate overall themes and analyses. In addition to data organization, categorization and theme allocation, Creswell (1994) finally recommends the testing and evaluation of developing hypotheses and the searching of alternative explanations (and deviant cases) before finally writing the report, a process which NVivo's search function also facilitated. However, while the software package proved helpful as an organisational aid, I found it essential to avoid too much fragmentation of the interviewees' commentary, since the holistic and usually highly-balanced evaluation contained therein would become diluted and miss-interpreted.

Validity and reliability

To further comprehension and to aid organisational coherence, the concepts of research validity and reliability are distinguished and discussed separately in my study.

Validity and truth value. As several scholars have argued (Rubin & Rubin 2005; Maxwell 1992, 2004; Guba & Lincoln,1989; Arksey & Knight 1999; Cohen 2011) it is important to recognise that the classic concepts of reliability (repeatability of process) and validity (measurement of what is claimed to be measured) derived from positivist social science do not sit well with the assumptions underpinning qualitative research and cannot be readily imported, although they recognise the value of continuing to raise such questions. Unlike quantitative research, qualitative research is not seeking principles that are true for all time or universal laws, but an understanding of specific circumstances; the hows and whys of how things actually happen in the real world. In interviewing, threats to validity particularly focus around concepts of interviewer bias, as the research instrument (attitudes, opinions, preconceived notions and misconceptions) and the bias and misunderstanding of the respondent (age, class, gender factors). Since my epistemology is grounded in an interpretive/subjective, one, it would be futile as Briggs (1986) stresses, to imagine that if one could strip the interviewing of all these biasing factors, the real or unbiased response would emerge. Qualitative researchers, however have responded to this problem by developing their own criteria (Lincoln & Guba, 1985) which shares much common grounds with the rules of historical enquiry (Arksey and Knight, 1999).

Truth value and authenticity, akin to validly, involves providing evidence that the researcher has captured a recognisably fair representation of things as informants see them. Consequently, during and prior to the interview process I have tried to enhance my ability to measure what I claim to be measuring by adopting recommended principles. I have endeavoured to build rapport and trust in order to enable the interviewees to express themselves openly and securely by careful attention to the setting (interviewee preferred) and by ensuring sufficient time to encourage informants to be able to illustrate and expand their responses at length. In addition I have consistently asked for, and myself initiated, clarification and explanation, checking throughout the interview that what an individual has said is what they meant to say. My status as an 'insider', with knowledge of the profession has further aided the clarity in understanding, which as Arksey & Knight (1999: 55) suggests, comes from 'immersion' in the research itself; a conceptualisation with which, from an historian's perspective, I am equally familiar.

By piloting the interview guide I have ensured that it encompasses the research questions fully, that puzzling questions have been re-phrased and that the whole incorporates themes drawn from the literature and avoids irrelevancy. My research design and selected research group has proven fit for purpose and has facilitated sufficient diversity in participants to enable me to examine the topic from but multiple perspectives (gender, age, job, institution). I have also identified and sought to explain the inevitable inconsistences of findings in my analysis. The significant considerations of researcher *neutrality*, pertaining to power and structural inequalities between interviewer and informant, which may impact validity are discussed further in '*researcher positionality and reflexivity*'.

Reliability and consistency. The assumption of a stable reality 'out there' which is to be precisely measured and described and that consequently the design tools need to be reliable and the process repeatable, is again inappropriate to an epistemology that views situated cognition, complexity and change as pervasive and normal features. Since my research seeks situational and conditional understanding (Arksey & Knight, 1999: 54), I have applied the more appropriate principles of consistency and transparency in my research, providing an audit trail for the readers' judgement, including access to raw data of audio recordings, (submitted to the British Library) and full transcripts, records of

analysis, data reduction and process notes, describing my thoughts and actions of how research was conducted and decisions made, thereby providing a 'thick description' of my findings and analysis (Rubin & Rubin 2005; Firestone 1993).

I address challenges to the validity of 'knowledge' obtained (or 'transformed') from the subjective participant to the subjective researcher in the interview process (Alvesson 2011) by acknowledging that interview statements are not 'direct pathways to the interiors of those being interviewed (as 'moral truth teller, acting in the service of science'), or mirrors of social practice' (Alvesson 2011: 2-4) and thus do not ignore them or 'do normal science as if nothing has happened'. As the researcher and primary research instrument, my own life-long experience and historical methods study are utilised to aid critical judgement as discussed in *reflexivity and positionality*, whilst recognising, as several scholars caution, that such limitations can neither be fully marginalised nor problems solved by exhibiting the qualities of the 'good' researcher, (minimization of power differences, empathy, sensitivity, insight, trust) often employed in feminist and what Dingwall (1997) refers to as 'romanticist' approaches (Fontana & Frey 2005; Reinharz & Chase 2003). Equally by not making claims or giving unwarranted status to interview material, as reflected in the research questions which emphasise the experiential and subjective nature of the data to be collected. Whilst using consciousness to recognise the intellectual challenges inherent in qualitative interviewing, I accept the principle that the alternatives to uncovering the social world (statistics, questionnaires, experiments, textual analysis) may not 'score better' (Alvesson, 2011: 5) and that 'flawed' information is better than none.

Ethical issues

Since interviews by their nature concern both interpersonal interaction and produce information about the human condition (Cohen 2011), the ethical dimensions integral to the research were addressed in the research design process to ensure the participants' welfare. My work-related awareness of ethical issues as a teacher was furthered by familiarisation with research councils and professional associations' regulatory codes, as recommended by Arksey & Knight (1999) including the British Sociological Association's Statement of Ethical Practice. An appreciation of such codes of ethics did specifically aid my personal

judgement and resolve some dilemmas (between ideals and fieldwork practicalities) with respect to knowing when to stop pursuing participants and to withholding confidential information when asked repeatedly for dissemination by other participants involved in the research, including head teachers, senior managers and ICT training counsellors.

Although the nature of my research did require a submission to Queen Mary University's Ethical Review Committee, since I did not intend to access vulnerable children, fieldwork was deemed 'low risk'. However, Queen Mary's Ethical research principles and standards were considered reassuring to participants well versed in the litigation and ethical awareness procedures of public educational institutions. I found that strictly adhering to their template throughout the research process, as discussed below in terms of issues of informed consent, confidentiality and the consequences of the interviews, served to protect my own independence as a researcher, as well as the interests of my participants.

Informed consent. Grounded in the democratic rights of freedom and self-determination, informed consent was provided and obtained from all participants. I incorporated the four aspects of Diener & Crandall's (1978) definition: competence, voluntarism, full information and comprehension in all stages of the consent process. The issue of competence was readily ensured by the nature of the participants as adult, responsible teachers. The relevant information upon which correct decisions could be deduced and risks (including time commitment) and benefits assessed, was provided by a written information and consent form which participants signed (**Appendix 4**), explaining the purpose and nature of the investigation, the valuable contribution of the investigation to furthering knowledge and understanding, research methods, the mechanics of the interview process, (included being audio recorded for one hour) and the contact details of the researcher and research bases. I further ensured comprehension by expressing information in clear everyday language in order that participants fully understood the nature of the research (particularly the subjective viewpoint).

Clarity was further reinforced orally at the commencement of the interview when participants were asked if further information was required, which proved the norm. The majority of teachers expressed the view that they were giving up valuable time to be interviewed because they considered the research subject to be important and that their perspective on educational technology had hitherto been ignored. They equally articulated concerns that their '*honest*' and

'forthright' comments remained confidential and could not be traced back to them for reasons of employment protection.

Voluntarism, enabling participants to refuse to be interviewed or to refuse to answer certain questions or to withdraw from the process once the research had commenced was clearly expressed in the documentation and was actioned by one organisation which returned a reply refusing participation (citing lack of interest by staff and lack of time) and by two senior manager participants, during the interview, citing a preference not to answer specific questions on the actions of their own team. To ensure that participants had the right, via reflection, to weigh up the risks and benefits of being involved in the research and to decide voluntarily whether to participate, the information and consent form and a request letter to institutions' gatekeepers (head teachers/principal) participation (**Appendix 5**) was always sent in advance of the interview.

Finally to guarantee rights to privacy; whereby the individual has a right not to participate in research or to respond to communication connected with my research, no follow-up occurred when initial letters (or emails) received no response from an institution's stakeholder, which proved to be the case with requests to fifteen private schools and ten academies in the London area.

Confidentiality and anonymity. I endeavoured to protect the privacy and welfare of participants with procedures pertaining to anonymity and confidentially which were made explicit (in both written and oral formats).

Anonymity, whereby information should in no way disclose individual identity, was assured to participants and guaranteed by never referencing specific names or institutions or any potential personal identifies and by using anonymising procedures including codes, index numbers and pseudonyms, but in such a way as to ensure that contextual data important to the research was not distorted or the specificity of the detail in analysis diminished (Walford 2001). Consequently, generalised terms such as 'head of geography' or 'assistant principal' in a 'London' or 'city', 'independent', 'academy' or 'state school' were employed and individuals were referenced (**Appendix 2**) using their initial audio file code, provided by the Olympus software programme which supported the audio recording equipment I used for conducting interviews.

However, there where occasions where anonymity, in the sense that participants were identifiable solely to myself proved impossible, for example

when interviews had been arranged within the school organisation, often by its 'gatekeeper' as a senior member of staff or the head teacher.

Consequently, I assured confidentiality by never disclosing individual comments, which could be attributable to participants or to the institutions in which they worked. This action was important in schools where I conducted multiple interviews and where there was some danger of citing colleagues' comments as exemplars or for comparative purposes. Equally there were occasions, particularly when interviewing ICT trainers when information on activities in other schools was requested. Consequently, access to all my research materials (letters, emails, research records, field-notes, audio recordings stored digitally and transcripts) were secured in my study and only viewed by my two supervisors. The credibility of such guarantees was crucial in the negotiating stage of the interview process and clearly affected cooperation rates with several participants identifying lack of freedom of expression and job insecurity due to the consequences of potential employer or line manager disapproval.

Reflexivity and positionality

Issues of *neutrality* as raised in the discussion of validity and reliably require the researcher, as research instrument, to reflect upon their own role in the research process (Patton, 1990).   For an interpreter of the already interpreted world of participants, clearly undermines the notion of any objective reality. Thus an acknowledgement of the influence on the research process of my personal biography (class, gender), personality (crucial to achieving rapport and trust), subjective experiences and mind set (assumptions and preconceptions) were deemed significant in order for my interpretations and conclusions to be effectively and contextually evaluated by the reader (Alvesson 2009, 2011; Fine et al. 2000; Reinharz 1997; Steier 1991; Arksey & Knight 1999; Kvale & Brinkman 2009).

Consequently, I employed self knowledge to address specific biases, particularly inherent in my disciplinary and professional sympathies with the interviewees, and an awareness of my personal values, attitudes and characteristics which would inevitably enter the research process and reduce the likelihood of fully appreciating the formers' perspectives and meanings (Hitchcock & Hughes 1989).   From a personal viewpoint my training in both

historical research and social science methods equipped me with the tools and mind-set to naturally recognise the non-neutral process of the qualitative research process. That I am not the objective agent depicted in positivist enquiries, but view the world through the subjective lens of a white, late middle aged, middle class women, is a well-realised stance. However, since eliminating researcher effects is impossible, I strove to combat reactivity and its effects on my research through reflexive objectivity, echoing Cooley's (1902) notion of 'the looking glass self'. The latter entailed close self-monitoring, continual reflection on interactions with participants and an acknowledgement that as the research instrument *par excellence* I brought my own biography (and prejudices) and contributions to the production of knowledge.

What was of particular concern to me was to redress issues pertaining to the broader power imbalance in the interview relationship (Foucault, 1998; 1991) and to minimise some of the restricting effects inherent in what is effectively a 'hierarchical conversation' (Kvale, 2006). I consistently ensured, consequently, that the interview involved a dialogue constituted in a manner as close to that of egalitarian partners as possible (Wengraf 2001; Briggs 2002). This was achieved by providing the interviewees with the discretionary power to determine the choice of time and place for the interview (usually empty classroom or office), by clarifying the purpose of research at the outset (so as to avoid hidden agendas) and by providing flexibility in both time allocation, agenda and conversation direction (for by definition my work is exploratory).

My second major concern stemmed from my position as an 'insider' (to some extent) with a personal biography of state and independent sector teacher (of History, Politics, Geography, ICT) and middle manager that mirrored the phenomenon under investigation, having effectively 'lived through' (from 1983) the thirty-five year period and phenomenon researched. Such commonality aided my ability to display shared understanding and to empathise with the lifestyles and working conditions of interviewees in my capacity as departmental subject and pastoral (National Curriculum Year 7) head (Arksey & Knight, 1999; Ruben & Ruben, 2005), equally allowing me to hear 'private talk' which disclosed the meaning so often absent from its 'public' equivalent. A factor, I believe to have been further enhanced by the distance offered from an 'outsider's' perspective by virtue of my deliberate decision not to investigate colleagues or organisations with whom I was working.

Additionally, having expertise, skills and technological knowledge at my disposal proved essential in effective communication with predominantly male ICT specialists, while roughly matching the socio-demographic characteristics of the research participants (particularly regarding age) aided the establishment of confidence and trust. However, my familiarity with professional culture could, I realised, have lead to a failure to be un-alert to the familiar, to be uncritical and accepting of institutional norms and due to my strongly committed perceptions and memories (rooted in historical as well as contemporary experience) to ask leading questions and miss significant factors outside my expected remit. My aim therefore was by constant self-reflection to check the 'rampant subjectivity' (Lather 1986: 68) inherent in qualitative interviewing with the emphasis on checking, not obliterating (Arksey & Knight 1999: 55). In this respect a rigorous review of the five pilot interviews initially conducted and their audio transcripts alerted me to preliminary questions which were clearly 'leading' in nature and to observations which contradicted my own personal experiences.

Conclusion

This chapter has focused on my research methodology and the framework for conducting the investigation. I have explained my methodological approach in terms of my ontological and epistemology stance, which reflects a personal history and what, in light of practical experience, I consider to be omissions inherent in previous research.   I have emphasised the importance of the holistic nature of the research design and outlined the various methods employed to achieve my study's aims and objectives. The research was broadly undertaken to understand how middle management teachers had experienced educational technology in the UK.   More specifically I sought to contribute to a deeper understanding of the effects of ICT on education and to greater insight into the relationship between technology and human beings, via the interplay of agency and structure.

By using a qualitative approach, the phenomenon was evaluated from the professional's unique perspective, as opposed to the more usual and narrower student-learning focus. This focus allowed the manifold personal and highly individualised meanings attached to the social phenomenon to become more visible to myself as researcher and for the varied interpretations of the actualities of what happened and why, to be better understood.   Any drawbacks inherent in

the time consuming nature of data collection or the rigors of such data's analysis were outweighed by its faculty for understanding the complex social processes involved in my research.

Chapter 4.

Educational Technology at the micro level of analysis

Introduction

This section addresses my empirical research related to the micro level of analysis, focusing upon the relationship between educational technology, the individual head of department and the relationships within the department (pertaining to Layder's *self* and *situated activity* domains). It seeks to answer the research questions related to the individual departmental head's perceptions of developments over time, the extent to which professional work has changed and the human and physical consequences for the department. After first outlining the agency-structure debate (to which this study seeks to contribute) to aid clarity, I define and position the secondary school head of department and proceed to discuss the associated themes which have dominated the field over the last 30 years and which have emerged from my research via expressions of continuity and change, and creativity and constraint, while identifying limitations in explanations and omissions in the existing literature in the process.

Minimal empirical research has hitherto been undertaken focusing directly upon the 'effects' of educational technology on teachers' professional lives and working conditions. 'Effects' when discussed have generally been tangential to the central focus of much study which remains predominantly learning orientated. Little attention has explored links to dissatisfaction and alienation levels amongst teachers, as expressed by contemporary problems with recruitment and retention and issues of an intensification of a north-south educational divide (OSTED, 2015). Underlying assumptions are generally deterministic; presuming technology to be predominantly beneficial and transformative, negative consequences are under-addressed and a continued emphasis seeks an explanation of (non) usage of technology; perpetuating the myth of teachers as predominantly irrational and conservative 'resisters' of progress and 'reform'. Some optimism for change, however, is articulated in terms of expectations resulting from the combination of a new generation of digitally literate teachers with flexible mobile technologies.

Agency-structure debate

Within the limited literature addressing the relationship between teachers as free agents and structural determinants, the differences prioritising the latter are often of degree. At the micro level of individual teacher usage, most academics of educational technology (as examined in Chapter 2) give prominence to the structural behavioural determinants (technological determinism; organizational culture and constraining physical and structural 'materialities'), implying that technology is something that is 'done' to teachers in their capacity as mere 'passive atomized functionaries' (Goodson et al. 2002). Hence the complexity that surrounds technology intervention is often unacknowledged. Although other non-technical factors may be credited by some educational technology writers, the role played remains subservient and reactive to the technology, rather than shaping or influencing it directly. The overwhelming interpretation remains visionary, often seeking to reimagine established practices; teaching styles, learning approaches and access to information as seen in Kozma's (2003) international impact studies, where a few human 'innovators' are granted exemplary status, irrespective of the lack of evidence of success or their applicability to differing cultural and national contexts. Emphasis is on the future, what 'could' and 'should' be, as opposed to reflection or analysis on the realities and past occurrences, which are not evaluated on their own terms but viewed as 'mistakes' from a deterministic path, to be rectified and corrected (Selwyn 2011b).

As previously ascertained from several empirical research studies and surveys identified in Chapter 2, educational technology is mythologised and assessed in non-neutral terms; associated with modernity, progress, economic efficiency and inevitable change. Such conceptual models, as illustrated in Dawes's (1999) analysis of stereotypical cartoon images of teachers, perpetuate a discourse of resistance and ineptitude in their relationship with technology. Hence educational transformation failure is explained in terms of teachers as impediments to progress rather than as agents of free will, making rational judgements or shaping technology in a mutual fashion.

Academics, who critique such viewpoints, while in the minority, have often grounded their evaluations in UK based studies, identifying themes which have informed my research by way of stimulating comparison and further exploration. Goodson's (2001) original challenge to the concept of the pre-

determined teacher's use of technology, for example, was based on an extensive body of empirical, qualitative-based data, elicited from investigations into UK teachers' lives, over a period of thirty years. His narrative and biographical methodology drew particular attention, to the neglected issue of unforeseen consequences (and the manner in which even the most planned interventions can be contested, disrupted, subverted and appropriated. Utilising evidence from in-depth interviews he has drawn attention to the on-going tension between what has been designed and strategised (by authorities, policy makers, ICT firms) and the play of 'unintended consequences, ill-fitting technological strategies and disorganised responses.' (Goodson, 2002: 7) Such concerns have long been voiced in the field of British sociology by Webster (2005), whose seminal studies of societal and technological change have focused on the capacity of individuals to use digital technologies in surprising subversive and unintended ways; viewpoints long accepted by historians of technology, such as Noble (1984) and Nye, (2007).

Although outside the educational field, but arguably no less valid, or applicable to understanding, Social Shaping of Technology studies also suggest that the human-technology relationship in domestic consumption, is actually highly complex and certainly not one of direct acceptance, but rather one based on complex processes of 'negotiation', 'adaptation' and 'meaning attributing' towards 'alien' technical objects before integration or assimilation ensues (Cowan 1987; Berker et al. 2006; Silverstone et al. 1992; Silverstone 1993; Lally 2002). Selwyn's summative assessment, however, based on three decades of UK school orientated research, concludes that the language used to describe such opportunities of *non a priori* ways of response is still often presented in a secondary reactive terminology as the product of 'unintended consequences', 'resistance' or as a consequence of subversion' to ill-conceived strategies rather than as a real active choice of the actors as leaders and designers of their own work and destiny (Selwyn, 2011a). For some academics (particularly ANT-orientated as noted in Chapter 2) the relationship remains more nuanced, but nevertheless teachers are never portrayed as completely free rational agents; and even where their autonomy is recognized within the classroom, as reflected in (the late) British sociologist and educational historian, Brehony's studies (2002), it is seen as relative, functioning interactively within social, cultural, institutional and technological groups and constraints.

Heads of department in UK secondary schools

Since the core group of study is secondary school heads of department, it is pertinent at this stage in my thesis to briefly define and explain their function and role. Middle management in secondary education can be seen as constituted, primarily, by heads of academic departments with responsibility for a curriculum subject area, leading a team of between one to five teaching staff (including newly qualified teachers). Secondly, by pastoral heads (of year) managing similar teams but with responsibility for a whole student cohort's welfare (e.g. National Curriulum Year 9). Both are supplemented by cross-curriculum co-ordinators such as special education needs (SEN) teachers. From 1995, a significant structural change, with implications for autonomy (as identified by interviewees), was represented by the introduction of a new middle management position, created often to embed technology more effectively across all subject areas, but primarily to administer the complex demands of running whole ICT school infrastructure; variously identified as Information Communication Technology or e-learning co-ordinators.

Estimating the numbers and specific roles of middle managers in English schools is challenging since both academies (approximately 63% of secondary schools in 2016) and independent schools (7%) are exempt from compulsory submissions to official government statistics, unlike their LEA (Local Education Authority) state school counterparts. Consequently, they are often only identifiable by reference to management point allocation (1-5), with the majority situated at levels 3 and 4.

As traditionally occupying the middle ground between senior management (heads and deputy heads) and classroom teachers, they offer a unique insight into educational developments from a dual perspective, further enhanced by their contemporary tripartite role as exemplary classroom teachers, departmental administrators and leaders and managers of departmental colleagues. The empirical data in this section is based on the fourty interviewees from heads of all subject departments (humanities, sciences and IT) encompassing an age range from the late twenties to the early sixties; several of whom, (via promotion) have additional mutli-role experience and perspectives as senior managers (head teachers, assistant principles), trade union representatives, governmental advisers and IT consultants. This data is supplemented by interviews from two newly qualified teachers (NQTs) which served to address a clear gap in knowledge and

understanding, generated by the initial interviews, which emerged as the research progressed (**Appendix 2**). To aid clarity, the following analysis is organised in two main sections, combining administrative and managerial issues as separate from teaching ones.

Managerial and administrative influence of heads of department

The literature (both theoretical and empirical) pertaining specifically to UK middle managers in education has been quantitatively unbalanced in relation to that on senior leadership (which continues to draw most research interest). However, once the move from a research focus on technology hardware (as its sole efficacy as an agent of change was questioned) broadened to a consideration of teachers as relevant factors in the 1990s, middle managers became more worthy of research attention. Although, the former focus arguably narrowed attention in the process, away from the analysis of whole school factors to a concentration on learning strategies, with the emphasis often limited to classroom-teacher-student orientation (Bennett 1999; Brown 2000).

Literature from university-based academics in the field of education who perceive the school department as a key unit of change and have analysed its complex internal dynamics of power and supporting structures (Wise & Bush 1999; Brown & Rutherford 1999; Bennett N 2005; Bennett et al 2003; Fletcher-Campbell 2003, with Jones et al; Turner 2003, focusing specifically on Welsh schools) have concurred both before and post National Curriculum legislation, that heads of department are both central to successful curriculum delivery and may exhibit genuine power and autonomy. Indeed Wise's extensive 2003 study (based on return claims from 1 in 4 secondary schools in England) concluded that such power could be welded negatively and effectively to inhibit educational development. Updating an earlier 2001 survey (to elicit comparative data) of National Curriculum Year 7 academic and pastoral middle managers, she concluded that *attitudes* towards change were 'unsatisfactory' and that there was 'no evidence that schools were any better prepared for the *future*' (Wise 2003: 42). While mindful of the limitations of a predominantly questionnaire approach, which leaves the fundamental questions of causation unaddressed (why developments are occurring) and defines *reform* narrowly (team working across subject areas), the study is significant in terms of scale and for a comparison of

developments with middle managers as evidenced in my research conducted between 2012-16.

Reflecting a more positive assessment, Glover's empirical study of 24 UK secondary schools (facilitated by a team from Keele University), albeit almost two decades ago, suggested that the real work of curriculum delivery was organised and managed through departments and their teams (Glover et al.1998). An interpretation articulated almost a decade earlier by Earley's study of educational leadership which suggested that departmental managers were crucial to the management of educational change and improvement (Earley, & Fletcher-Campbell 1989); although the head teacher is recognized as the formulator of organisational 'vision', it is the 'people in the middle who implement the vision' (Planter cited in Harvey 2002: 32).

Although Earley's evaluation was intended to be complimentary, the power differentials implied in strategic initiative and mere implementation are evident. While all the head teachers interviewed and departmental colleagues concurred on the significant (e.g. '*crucial*', '*vital*' '*most important person in school*') role of departmental heads in curriculum delivery and, at least, in theoretical terms acknowledged their independence, departmental heads themselves recorded increasing levels of constraint as manifest through interventionist IT co-ordinators and head teachers. Wise's (2001) attribution of middle managers in UK schools with overriding decision-making capabilities and the autonomy to lead departmental teams in all areas of educational delivery, from curriculum resources and student discipline to professional development was a view no-longer applied by most mangers to themselves, as interviewed by 2016 in my research.

In practical terms most departmental heads recognised the conceptual difference between 'significance or importance' and 'power and autonomy'. Several identified specific constraining influences upon their managerial freedom, expressed by the imposition of budgetary approval in purchasing ICT equipment, accompanied by feelings of enforced deference to agencies external to the department, in one of the manifold guises of the IT administrator. Trends identified in Bennett et al.'s (2007) middle management leadership review over a seventeen year period (1988-2005) concerning role conflict tensions between departmental loyalty and whole school focus were exhibited throughout this research (discussed in departmental vision conflict).

The extension of such centralising tendencies into previously autonomous departments was acknowledged by one head teacher as representing a significant cultural change. Although the internal conflict, Janet_a describes below, is attributed to differing perspectives of the goals of ICT equipment, it is significant that the whole school interest ultimately overrides that of the subject department's (despite being latter's professionally employed, primary responsibility):

> 'The *heads of department* see *technology* as something they *buy for their needs*, that suits them. The *Director of ICT* thinks that that is *his money* and that any *money spent should* be on a *product* that could potentially benefit *the whole of the school* at some point. So if a head of department says I want to buy a stylus to use with my iPad for sake of argument, he will *not let them buy that.* It is a significant *cultural change from the past*, because I think the way HODs viewed it was that this is my *pot of money* and I'm going to spend it on *whatever*.'

This intensification, as opposed to the heralded diminution of the hierarchical 'pecking order' with respect to ICT policy decisions, is further illustrated by Steve_a, who even in his high status role as 'trusted' ICT director has his experience-based expert judgement overruled by the '*technology interested*' head teacher. An awareness of a position of powerlessness and inability to negotiate in the face of, often, highly personal preferences of superiors, is exhibited throughout the interviews:

> 'I'm getting *pressurised* from the *head* to get another VLE [virtual learning environment] because *obviously* she's seen *another school* that's got one. So we are looking into lots of different options *bu*t we can't honestly say we've got something *that most staff are going to use*.'

While such personal power remained applicable to heads within independent and LEA schools, however, interviewees from UK academies noted an abrogation of traditional leadership authority (decision-making and vision articulation) from the head teacher to the new, often foreign (US) based consortia than now ran them (as further explored in Chapter5).

To some extent greater autonomy was expressed by mangers describing independent schools as opposed to academies. Flexibility and diversity were both more respected and accommodated with regard to personal teaching styles and individual preferences in ICT equipment. Steve_a's natural inclination to replace interactive whiteboards throughout his independent school, for example, (because he personally disliked being 'tied to the front of the room' and regarded them as only being utilised as a 'projector screen') was checked by the acknowledgement that his fellow heads of department '*could not live with out them.*' Several

managers also explained this level of autonomy by virtue of perceived success in public examinations (GCSE and A level) and hence school league tables, whereby the achievement of high grades, by traditional methods, facilitated a clear priority over any technological proficiency and thus greater scope for departmental independence. Several e-learning co-ordinators, whose role was to encourage greater use of ICT, concurred with Tom$_a$'s reasoning:

> 'Why should they change their *pedagogy* because what they are already doing is getting *excellent results*?'

Several managers noted how the state sector and academies, in contrast, were more pressurised to utilise equipment in order to justify whole school expenditure and to attempt to realise the argument (discourse) that technology could improve the results, particularly of the less able student (often to which they were catering in mission statements). Hilary$_c$, head of music in a city academy, for example, while recognising the artificiality of enforced employment of ICT (via online platforms) as driving usage (as opposed to human judgement), nevertheless conforms to organisational directives and expectations:

> 'It did feel like a *real emphasis* on making the most of *what the school had paid* for *whether or not that was going to make your lessons better of worse. It was more of, please use this, because its available* and *we'd like you to use it.* I especially *feel* that here because there *was a real drive* at the beginning of this year to use FROG and the Google drive that we now are using it. And in that way I felt ..more *pressured* to use it.'

Several oganisations were also clearly perceived as having the ability to enforce the use of technology via monitoring staff channels, as Roberta$_c$, a head of year in an academy describes, by virtue of setting ICT as one of the criteria to be appraised in the classroom:

> 'We've also got something called 'learning walks' which is just a 20 minute period. Whoever is *observing* you comes in for 20 minutes, looking for something specific, so sometimes ..it will be on how you will deal with SEN needs in your class and it will be on *ICT usage*.'

These appraisals have also to be digitally recorded, data standardised and input into a recently acquired software program called 'Blue Sky', providing an additional, duplicated, task for the majority of staff whose preference is to use pen and paper:

> 'The majority of teachers will still sit their *with a pad and pen* do their observation *and then* enter it. Its only a *few* who've brought lap tops with them that will do it live on Blue Sky as you're teaching a lesson.'

Even when personal discretion appears to be offered (the professional's preference is for paper, over digital data recording), the organisation can ultimately demand conformity via justification requirements, with the organisation's demands internalised as reasonable even though conflicting with personal assessment (attributing criteria to financial, as opposed to sound educational purposes):

> 'If you say look I really like having *all my marks in my paperback* mark book everyone says *ok that's fine. As long as* when we do data drops, four times a year then you put *your data on a computer* you can put the rest of your data wherever you want. But I do think… *you do have to justify it if you're not using technology because we've got all this technology and obviously we've* invested money in it and time.'

Innovation theory and heads of department role.   Much of the literature on teacher leaders and educational technology invariably positions developments within the broader sphere of school reform and innovation, referencing the extensive research of the educational academic, Fullan (1982, 1989).   Although his theories are based predominantly on empirical research conducted in the culturally distinctive environment of north American schools, his most widely cited work; *The new Meaning of Educational Change* (1982), has been well-received by UK governmental advisors and has initiated international debate concerning the concept of spearhead leadership as the catalyst to ICT change. Although the dynamics remain controversial, a consistent theme throughout three decades of research (Dexter et al. 1999, 2002; Harris 2002) has been the key role attributed to the *individual* teacher as agent of change and by implication the head of department as subject leader and exemplar teacher; 'change depends on what teachers *do* and *think* - it's as simple and complex as that.' (Fullan 2007: 129) Aaron[b], a head of department and ICT trainer emphasises the enduring popularity of such strategy in 2016 when describing his company's methods:

> 'We recommend *digital champions* and the internal training model but at the same time, supported by experts or external. As always when I did my Management for Change masters degree, we were doing the *Fullan Model*.'

Several heads of department also emphasised the internalised commitment to such assessments by identifying themselves either in a personal capacity as '*exemplars*' of '*progressive technological practice'* themselves or as sound judges, encouragers and supporters of their colleague's ICT expertise.   Whatever

the specific leadership style, however, an expectation was significantly perceived as a need to disseminate the virtues of keeping abreast of, and encouraging on-going exploration with *new* technological (equated with creativity) developments within the department. One which involved, publically (and theoretically at least) granting a status, to technical skills proficiency, which had previously been afforded only to excellent pedagogical practition, forged through experience. As Emily[c], (managing in a supportive and collegiate style) explains:

> 'I think we're very much all *equals* in this department. Everybody brings *something* to the department and people are *very creative*. We've all got I think *good ideas* and we *share* them. There's no one person who's the *expert*.'

The onus for the departmental head to be visibly keeping up to date with technology appears significant irrespective of departmental context. As, Liam[b] another head of science illustrates, by exercising leadership skills which, while acknowledging personal ICT limitations, retains power and authority through the customary channels of task delegation and centralised information control:

> 'A *good* head of department should be able to take into *consideration what is going on with the technology*. Whether by being *on top of it themselves* or by *allocating it to various members of department*., so they can then *report back* and tell them *what is going on*.'

Some theories of curriculum change, targeted specifically at educational technology use, have emphasised the power of the individual further. Watson's (1993) studies have addressed suggestions that once a small cohort of innovators has been established, their adoption of a particular innovation cascades through the peer group of subject teachers. Empirical research (Watson & Tinsley 1995) conducted in English, Canadian, Dutch and Spanish classrooms, indicated to the contrary, that such transformation had not occurred and that innovators remained in a minority. One must naturally be cognisant in such assessments of the distinctions between ICT usage for administrative and teaching purposes. The majority of all heads of department, I interviewed for example, employed computers extensively for both personal and administrative use, yet it is classroom usage which usually dominates external evaluation. Most interviewees concurred with Watson's assessment (three decades earlier) of technological innovators as a minority group, as articulated by Dominic[a,] a head of department and senior manager:

> 'I've spoken to almost *all the staff*. They all use it *personally* for *administration, for emailing, registers*. Those kind of things. ..Then others

are doing lots of other *transformational things*. That's a *lower level* I think.'

Moreover, Watson's critique of the role model catalyst 'myth' draws significant attention to flawed assumptions concerning innovator perceptions by colleagues. He argued that some enthusiastic innovators actually inhibited their colleagues; identifying the former as '*mavericks*', different from themselves and widening the credibility gap further, even within the same subject culture (Watson 1993). As Evelyn[b], in this research confirmed, the effect of proficient technical capability can actually be disconcerting to others, who may feel in comparison, intimidated and thus alienated:

> 'There was one teacher who was very *brilliant at technology* and very *creative* with it,.. but that served *to diminish the contribution* of *other members of staff* to some degree.'

It is noticeable from this research that the traditional and '*natural*' method of leadership exemplification through classroom observation by colleagues has become increasing unsustainable. Although time poverty and the relentless pace of technological change (mitigating any claims to expert status) is often cited as contributory factors, structural organisational changes which prioritise mandatory classroom observation in hierarchal and highly formalised (with direct employability and promotional implications), as opposed to horizontal (peer to peer), in-formalised formats is accorded direct 'blame'. Most heads of department are themselves observed in an evaluative capacity by superiors (often from outside their subject specialism) in a line management hierarchy, which is often considered as imported from external management systems and one at odds with traditional professional practice. One head of IT, Graham[b] illustrates regretfully how over his lifetime the opportunity for informal advice in a trusting, not competitive or threatening atmosphere has been eliminated in some schools by new externally imposed organisational rules of behaviour which creates a more hostile and paranoid working environment:

> 'The *trust has disappeared*. When I started teaching at first we were a department of 4 and *everybody helped everybody else*, we all went into everybody's rooms and if we had some work to do, because we didn't have offices, then we used to sit in the room and everybody trusted everybody else in there. Nowadays if somebody comes into your room you *can be 'done' and disciplined by the head* because *you are watching how they operate*. And if you come up with *any advice*, you must have been *criticizing what* they do. So we lose trust and that's why everybody's *compartmentalise*d today. It's a *great shame*.'

Departmental influence & individualised professional development.

Fullan's developed theory of successful innovation in the 2000s has focused on the theme of the individual as part of a *group*, with effective change the product of the development of professional learning communities, as opposed to the well established (Lortie 1975; Goodlad 1984; Rosenholtz 1989) and prevalent discourse of autonomous and isolatory teacher working practices. (Fullan 2007; McLaughlin & Talbert 2001, 2006; Durfour, 2006).   The concept of an 'energised collaborative culture' (Wise, 2003), widely acknowledge as the root to change in many studies (Newmann et al. 2000; Hargreaves 2003; Scardamalia 2002) has clear implications for the (un)supportive departmental head, promoting the requisite values of trust, respect and integrity, essential to secure the full exchange of ideas and for the face to face departmental meetings (once protectively timetabled on a weekly basis) in which they are expressed and nourished. This research indicates that whist the traditional head of department responsibility; keeping abreast of, and disseminating new subject or pastoral specific developments internally (including identifying INSET provision for colleagues) has remained a prerequisite for many middle managers, the methods of delivery and to some extent the overall responsibility has changed with the extension of technology.

The 'collaborative community' has increasingly evolved as one which is more external to the department, particularly due to the erosion of the non-judgmental, supportive role of the departmental head, with a formalized (officially recorded) supervisory and monitoring one. ICT, additionally, often viewed problematically as the creator of information overload, has been adapted and creatively employed to address several internal challenges by departmental staff. Internet-based communications technologies, for example, including email, social media and conference facilities have been used to circumvent the loss of more traditional channels (promulgated by LEAs sponsored subject advisors and training programmes) of continuing professional development and face to face collaboration (pursuant to departmental meeting reductions) due to time pressure, significant CPD budgetary cuts and internal organization restructuring.

For many managers this takes the form of encouraging the development of individual personalized networks which, in the process, are consequently less reliant on accessing heads of department and colleagues' input, validation and control, but rather on (more neutral) peer groups, external to the department. Justin[a,] a humanities' faculty head and vice principle describes this trend towards supplanting traditional sources of educational inspiration (and authority), embedded in departmental commonality with increased self-reliant and individualism when recalling the demise of the once almost institutionalised font of new educational ideas; the printed Times Educational Supplement (TES), with more personalized, less judgmentally-threatening, and consequently less normative-value inducing digital networks:

> 'People still access the TES for jobs. There's still the staff room flick through, but I think its *lost its primacy*. For a while I thought it was really good at *professional development* stuff and I would always have read the Times Ed. every week. Now I might go into a school from one week to another and tell that the Times Ed magazine section has not moved from where it was. I think if you're talking about *getting inspiration about technology*, you've got the use of *people's informal personal learning networks* with *Twitter* and *Facebook etc*. [offering] free technology for teachers [and] superb ideas and resources. There are …Twitter networks which focus around different *subjects*; so there's the MFL Twitter, arty, with Joe Dale leading the way on that. There's the work that Russel Tarr has done with active learning and technology based learning in history and humanities. So I think there are *ways that staff access* those sorts *of ideas* in a way that they perhaps used to do through *print based media or going on training course*s and there is *no money for that any more*. So I think that's very much a twist *back to the individual finding ideas* or individuals having *networks of people* who share ideas with them.'

The extent to which departmental influence can be exerted on teachers, and departmental culture can predominate whole school ethos, (for good or ill), has been raised in some studies which evidence distinctive diversity within the same organization as with McLaughlin and Talbert's research, (2001) contrasting English and social studies departments in Oak Valley School; part of a wider study of 16 high schools in California and Michigan. The potential for a 'weak' department to influence colleagues negatively had also been identified by Little (1990) over a decade earlier when he observed that although teachers may work collaboratively, 'mutual reinforcement' can work equally powerfully in a negative capacity, perpetuating poor 'habits' of thought and eroding teachers' moral commitments. This research did evidence certain subject departments as being collectively perceived in stereotypical language ('*awful', 'ridiculous'*) by some IT

co-ordinators, as being less prone to embrace technology than others. Some departments were even accorded a distinct anti-ICT stance; with English and Classics deviancy being compounded by their '*pride*' in being an '*academic, not* (traditionally, low status) *technical department, achieving top grade examination results in a traditional fashion.*' The following supporting, extract from Tom[a] additionally draws attention to the transformational power attributed to a '*new*' departmental head, albeit by an external viewpoint which contrasts significantly with the more modest and restrained self-assessments of most subject managers interviewed:

> 'Take the *English* department. A few years ago it was *awful*. They wouldn't even *allow* us to put a computer in the room. Then they got *a new* head of English who was saying this is *ridiculous*. We need a digital screen, plus projector in here. Why is this equipment not available? So, I think that's what's happened I think a lot of *new* people have been brought in.'

This research, however, suggests a growing trend towards an individual empowerment and self-reliance, facilitated by ICT developments (via access to external support, encouragement, validation and new ideas) which has reduced much departmental influence, as exemplified through the pre-eminence accorded to the extensive personalised support network of Anna[d,] a head of German in an independent school:

> 'So it's your own individual research [that is crucial] and one of the main things I do. I'm a member of *Twitter* .. I follow different language teaching communities like the Oxford University language department for methodology. For current affairs and what's going on in the country its following all the [online] German newspapers. Then also *signing up* to things like the *TES* which has fantastic language teaching *resources* and lots of *discussion groups*. And other places where you can see what's going on as well is through *exam boards*. If you're signed up to all of them they will let you know about anything that's going on. So it's a case of *researching yourself* and ensuring that you've got *contacts.*'

The diminution of departmental influence on its members is further evidenced in the assessments and actions of several IT administrators regarding their whole school training strategy. Abigail[c], an experienced e-learning co-ordinator for example, whilst acknowledging the critical role of heads of department, explains how due to previous '*failures*' of top down initiatives and consultation (attributed partially to her own self-perceived 'lower' level status), she now circumvents leaders and targets departmental staff directly, since she perceives them to be the real 'drivers' of technology in the classroom:

'I think the heads' of department are critical, ..but not having a great deal of success with that in the past, .. my approach has always been we'll go to *back door entry*. Go *straight to the staff* . My experiences not just in this school but in other schools as well has been that its usually been driven by the *staff* not the *heads [of department] and the heads* are usually the last ones to embrace it.'

Digital divide and departmental staffing. While investigations of individual teacher attitudes to ICT (attributed to multiple factors including skills, personal feelings and psychology) are manifold (Cox et al.1999; Pedretti et al. 1999), minimal research has been conducted into the relative (de) motivating consequences of pro-ICT or anti-ICT middle managers within UK secondary school departments with regard to their potential socialisation effects on the (usually) younger, certainly inexperienced, and thus more malleable, newly qualified staff for which they are directly responsible through induction processes.

Similarly, although the development of new divisive tensions, emanating from power distortion generated by differentiating staff technical competency levels, (often simplified as intergenerational innovation related tensions) has been identified (Selwyn 1999), investigation remains insufficient. Certainly, popular commentary acknowledges that the traditional master-apprentice relationship, between the usually more experienced departmental head and the younger novice, training teacher has changed from the 1980s (and even reversed), but to what extent and in what manner is debatable. The popular discourse of the conservative, continuity-seeking, technically inefficient senior teacher has been promulgated by conceptualization of a generational gap in which older teachers are stereotyped as digital "dinosaurs" (Prenksy 2005, 2008a; Long 2005; Veen & Vrakking 2006; Pedro 2007; Palfrey & Gasser 2008). In this scenario heads of department are perceived as lacking the technical fluency of younger generations of *digital natives*, hampered by having to adapt to unfamiliar skills and communication formats and failing to accommodate their pre-digital lifestyle to the new digital world.

This research suggests that such stereotypical ideas (fostering *us and them* concepts) have been embedded and reinforced prior to actual organisational experience, with some younger teachers emerging from graduate training programmes with perceptions of older staff certainly not as respected role models but as conservative, ICT illiterate (unfamiliar with new equipment) and

themselves as a independent, progressive modernises, as articulated by, Anna[d,] a young head of German:

> '*When* I did my *PGCE* [Post Graduate Certificate in Education] there was a real big *drive* to get people using ICT. So a *big part of the PGCE* was being taught how to use SMART boards and PROMETHIAN boards and really trying to get *us*, the *new teachers* to be using them. And *we were told* at the time that *you would find in schools lots of teachers who weren't using them and were quite reluctant to use them but you had to be strong.* Go in there and also it would be good for the schools. They wanted *young people* coming in that could use the technology.'

The familiar reduction of the complexities of the unique human condition to generalised conceptualisation, in order to facilitate understanding, is evidenced by another young teacher's demonstration of empathy towards the '*other*' by referencing the only, other known quantity of age in her life, as exemplified by Jane[d] 's technically challenged parents.

> 'I think for some people it is, without *stereotyping, older members of staff* who are *getting towards the end of their career*, it's a *massive thing* to take on this *new thing* that is *very alien concept*. Even looking at *my parents*, they still find it really *hard* to use *iPhones* and things like that.'

The generalised perception of '*older staff*', particularly those close to retirement, as unwilling to learn new technical skills, is also articulated by senior managers and ICT co-ordinators (heads of department being notably reluctant to comment on each other). As, Charles[b,] a middle manager, with 25 year's organisational experience observes, when ascribing a cost-benefit analysis in his explanation:

> 'To be fair it is some of *the older people* perhaps in our school that are coming *to the end of their careers* who may see *no great necessity* to develop although they obviously *have to use* [existing ICT]systems.'

The discourse often disseminated by governmental ministers that the natural affinity between youth and innovative technology, coupled with population demographics (wastage, retirement of elderly staff) will lead to a modernisation of UK schools is reflected by Ian[c]'s assessment, as a head of department and ICT training consultant (with experience of several schools):

> 'If you are looking for *innovation* you tend to look for the *younger teachers*, because that is where you are going to get a better *chance of finding them*.'

However, after 30 years, the vision outlined has arguably not been realised. Although the inconsistent, yet financially expedient governmental policy of extending the teacher statuary retirement age to 68 years has affected

demographics, the relationship between educational technology and the individual is more complex. The assumption which equates technical innovation with youth is clearly flawed as this research shows. Most heads of department considered themselves to be not only forerunners of technical development in the 1980s, when computers were non-existent or in their infancy, but life long learners and continual engagers with educational technology innovation throughout their careers. Attitudes and behaviour which reflected creativity, acceptance of experimentation and enthusiasm for new methods of working, as articulated by Nick[a,] an ex head teacher, head of history and current advisor, while self-assessed in terms of *uniqueness*, were actually widely (if modestly) articulated throughout the research interviews. Personal qualities of initiative, independent thinking and perseverance in an often unsupported, yet open and accommodating school environment are clearly more significant to technological development than factors related to age. The encouragement so essential, however, to any learning situation is notably provided by a small elite group of colleagues and the whole has a clearly valued teaching (non-administrative or managerial) goal:

> 'I had a vice principle who being a geography teacher was *mad keen* about the BBC Doomsday project and the big lasers dics. …but *otherwise* there was very *little direction or encouragement from school leadership* it was very much an i*nitiative* from those of us who were *teaching*. The head of English he eventually ended up as a *head teacher* so did I. The head of maths was a *vice principal*. You know, so we were quite a fairly *unique bunch* all being in the same place at the same time and *encouraging* each other. My second in department went on to become a head teacher as well, so it was a fairly *unique* grouping.'

In departments led in a collegiate style, mutual inter-age collaborate learning was generally perceived as non-threatening and normal, as is the assessment of the school as a learning organisation *par excellence*. Indeed newly qualified teachers and younger staff have been traditionally expected to disseminate the current fashionable ideas (technical or otherwise) expounded in their respective colleges and universities, within a supportive environment of departmental meetings and informal peer observation. This mutual respect is expressed in the enthusiastic appreciation of James[b,] a senior head of mathematics in his late fifties, for his newly qualified teachers:

> 'A *new teacher joined* us this year and I think *just being newly trained*, they must be having a different type of training and I'll go in and see what she does and I think cor that's a really nice idea, that's really clever. I would never have thought of that and I'm always *in awe* of what my

colleagues do. I think how *fantastic* is that and how lucky the children are too.'

Another head of physics, Andrew_a explains how his enthusiasm for educational technology was actually initiated by a younger teacher:

> 'That's certainly how *I got caught* by a *newly qualified teacher* who took me on *one side as head of department* and said look this BBC that has been sitting in your room, this can actually do something and he brought me along and *kindled my enthusiasm*.'

Some tension can be attributed to the adjustment required by the recently qualified teacher to an unfamiliar situation in which the experientially engrained teacher-student (age and authority based) relationship is starkly reversed. However, as exemplified by Ria_{e,} one NQT such initial anxiety is subsequently diminished in the light of actual experience and the positive response from older staff.

> 'So when I started in my first job (2006).. I was made the ICT representative with a role which *involved teaching more experienced members of staff* how to use the *interactive whiteboards* which was quite a *daunting experience*, being *24 at the time* and having to teach *55 year old people* including the *head teacher* ..but also [there was] *openness* and the people *really did want to learn*.'

While some middle managers (exemplified by Carl_e) did differentiate stereotypically between the '*limited*' digital skills of '*my generation*' with the '*heck of a lot better*' skills of the '*youngsters ..living their lives on technology*' and '*working all day on the computer*', they were ascribing an evaluation which clearly distinguished the broader social value from the limited educational one. The same individual, in his capacity as a trainer and public examiner, observing young teachers' lessons was subsequently '*shocked*' to discover instead of ICT instigated '*discussion*', '*argument*' and general '*contribution*', as anticipated, the employment of traditional' content driven '*didactic*' lessons with '*the teacher delivering their knowledge to the pupils and imparting*.' A similar perception is expressed by Emily_{c,} a head of science, who observes comparatively, that while low-level manipulation of technology may be evident from a young teacher, the pedagogical ideas are not unduly innovative:

> 'So we have one teacher who is in his second year, so he joined us as an NQT and he's got *very good ideas*, although I'd say *not beyond what we have got.* I think we're *up to date.* So I don't think that he's especially *more skilled than we* are although he has commented on the way I 'Google' things, a long hand way whereas he would just be more *keyword savvy*'.

Certainly most of the subject departmental managers interviewed concluded that young teachers (often compared with their own children) were generally highly proficient and '*confident*' in the personal uses of technologies, but '*not as good as you might suppose*' in utilising ICT for teaching purposes despite the fact '*that they are all expected to possess GCSE IT qualifications*'. As an assistant principle, Justin_a cautioned, however, any stereotyping is too simplistic an interpretation of reality:

> 'I think that's *simplistic*. I've worked with colleagues who are more at the *end of their careers*, who *enjoy using new technology* and I've got staff who are *very new in, who are in their early 20s and have absolutely zero interest* whatsoever, and they *don't want the engagement* because they don't feel it has a part to play in their lives.'

However, a significant explanation inherent in of any use of technology, but one particularly pertinent to young teachers, as perceived by mangers, is the necessity, due to constant internal and external monitoring (e.g. OFSTED), to avoid any risk-taking, which may, by dint of equipment failure, (accompanied by disruption and indiscipline) limit student teacher experimentation. As recognised by Nick_a:

> 'I think the *external pressures on producing performance* whether they come from school leaders or from government or from parents are having a *significant effect* on the *innovative approach* that people would take in school. *Risk* it. Have a go. If it doesn't come off then fair enough and I think in our hearts, school leaders that's what we want to say to people *but there's a massive nervousness about delivery and performance.*'

This research has found no evidence to suggest that heads of department feel threatened by any real, or mythical technical proficiency emanating from their younger colleagues; concern for the latter's welfare being more paramount, with dissatisfaction directed towards senior management as being responsible for exploitation and failure to provide crucial support structures. For some departmental heads, particularly referencing academies, NQTs are perceived as being too heavily monitored (including preparation) and over-burdened. Several heads of department articulated concerns that the young teacher is leaving the profession, partially because they are receiving limited support in comparison with a time when as Owen_b, a head of ICT explained:

> 'We ran an *excellent programme working* with the local training colleges. Now they are deployed '*as pawns*' and *supply, covering for absent teachers*.'

The internally well-acknowledged, but often unvoiced, growing problems with recruitment and retention, is attributed, pragmatically by Chris[b] another head of IT, to the strategic thinking and decision-making of his younger staff who are:

> 'only intending to work for the *requisite 5 years* to *pay off* their government policy induced *graduate loans'*.

Certainly, the NQTs interviewed and a recently appointed head of department in this research, Colin[d,] perceived teaching, no-longer in terms of a life long professional career and vocation, but one which was to be temporarily endured (*'I don't want to be a teacher for a long time')*; useful for acquiring transferable skills from which to progress to better working conditions, pay and prospects. The (negative or positive) influence exhibited by subject heads was not deemed significant, apart from, ironically, exemplifying an overly *'pressurised, stressful'* and constrained working life which they chose not to pursue. One head of physics, Liam[b] encapsulated in his assessment the challenges which most middle managers concurred deterred their young staff:

> 'What you have to do *now* of course is *to evidence* that and to be able to show that to *an external assessor* whoever that might be, whether its *Ofsted* or whether its simply a member of *you senior leadership team* on a *'learning walk'*. We're being *judged far more rigorously and onerously* than we ever were before. I can't remember ever a senior member of the leadership team during my *20 year's of teaching coming in to see me teach beyond my probationary period,* and then it was only two or three visits during the course of that, and now of course its *commonplace for people to be in classrooms all the time*. One hopes that is done supportively and for the right reasons *but I don't always think that staff always think that that is the case*. They [NQTs] are *constantly* under inspection or judgement, and examination. *Far too many young teachers are falling out of the profession too early* and I think that it is partly because they are *being expected to do more and more* with less and less in terms of resources and time.'

Heads of department and management responsibility. The introduction of technology in schools, I suggest, has been complicated due to its concurrence with fundamental changes in the nature of the head of department's role; primarily the adoption of managerial styles, emanating from the USA and evolved in an educational culture, quite different from its British counterpart; the significance of which has been under-estimated.

As Adey (2000) observes, the job has changed significantly since the 1980s when it was primarily concerned with the management of resources, routine administration and usually performed by the most experienced member of the department; leading by example and exhibiting relative professional independence, empowerment and creativity (Adey 2000: 425). Planter and Harvey's UK-based empirical studies evidence that many appointments made in the pre-1990s were based on criteria related, primarily, to successful teaching, administrative skills and experience or longevity (Planter cited in Harvey 2002: 33).

Post 1990s, however, the role has shifted from one that equated departmental heads with teaching seniority; acting as exemplars to colleagues and managing resources, to one which incorporated the wider dimension of key leadership (once solely the preserve of the head teacher). Namely, the management of a professional team of subject specialists, with responsibility (expressed as accountability) for the quality of teaching and learning within their department and necessitating new higher levels of staff monitoring and evaluation (Busher & Harris 1999).

The impact that managers, usually professionally unqualified in (people) management skills and ICT pedagogical training, would have on their department and the extent to which they are sufficiently equipped to undertake such extended duties, has received minimal attention. Yet the issue warrants debate not least due to the longevity of many heads of department, often in situ until retirement at 60 years or plus, with promotion perceived as the pinnacle (rather than the transitory stage) of a career.

This research did evidence some negative consequences of poor management with some teachers citing unsatisfactory treatment by '*authoritarian*' middle managers. One NQT, Ria$_e$ for example, was told to '*stop pursuing her masters degree studies*' and to devote '*all her time*' to school commitments. Another experienced (ex-head) of English teacher, Susanne$_d$, was asked to '*leave the organisation*' due to alleged classroom '*disciplinary problems*,' rather than being offered professional support. Several staff commentated on the lack of will or skill displayed in resolving personnel problems, with a preference for the individual concerned to be pressurised to leave the organisation, rather than resources being allocated to deal with normal managerial challenges. Incidents of staff bullying, however, were usually confined to the realms of senior

management.   Whilst cuts in the provision of LEA in-service management training courses for aspiring to middle-managers (in which I participated) were acknowledged as contributory to low standards by several of the departmental heads (notably with masters degrees themselves), the deployment of sound people management skills in running departments was considered to be an inherent feature of the teaching relationship, derived more from individual personality than specialist knowledge and understanding. The assumption that relationship skills honed with children could be transferable to adult situations, may explain the complaints of some staff who felt regularly '*infantilised*' in their treatment by '*superiors*'.

Departmental monitoring.   Based on empirical evidence from English secondary schools, Brown et al. (2000) and Bennett et al. (2006) have drawn attention to the tensions and anxiety felt by middle managers by the introduction of devolved leadership and the delegation of responsibilities previously considered to be the domain of senior management. One of the most onerous and controversial new duties (questioning of purpose, methods, effectiveness) encompasses the role of monitoring and evaluating departmental staff, through formalised systems such as checking internal marking, lesson observation, target setting and action plans. While managerial responsibility is normally considered to encompass multiple competencies (mentor, facilitator, co-ordinator, director, producer, broker, innovator as outlined by Quinn et al. 1996), I suggest that the conflict ensues from a distortion and of this broader role to one which equates management narrowly with the monitoring process. Certainly, all managers interviewed preferenced the former activities as both personally enriching and valuable, whilst dismissing the latter as forced and superficial.   Moreover, I suggest the supervisory role has been aided by ICT developments due to the ease with which large scale, diversified organic activity can be (apparently) converted into digital format and thus numerically measured and analysed (or 'managed') from centralised (office-based) locations via a desktop computer.

Although the need for accountability is acknowledged in some empirical studies and even 'welcomed' by team members (Wise 2001), other departmental heads have expressed reticence and feelings of being ill equipped to perform such duties. Glover et al. (1998) attribute the latter to issues of professionalism and a reluctance to appear to be in judgement of colleagues with participants critical of developments which mitigate collegiality, produce anxiety, division and rancour

and threaten the important team cohesiveness which is considered to play a crucial role in departmental effectiveness (Harris, 1998). Studies published from the 1990s have elicited tensions for the departmental head due to its positioning between the conflicting new demands of a (expanded) centralising and controlling, Senior Management Team (SMT) and its own, often more collegiate management style which values the development of team spirit and egalitarian ethos (Earley & Fletcher-Campbell 1989; Bennett1995, 2006; Wise 2001).

Some departmental heads in this study employed monitoring management technology as a preferred personal choice, since it was perceived to positively aid their supervisory duties. One head of psychology, Jack$_c$ for example, found it practically invaluable in accommodating the needs of the observation of multiple staff in a split site school. Whilst lesson observation still necessitated travel, the review of marking and the analysis of marks (mandatorily) submitted electronically, could be centralised and location independent:

> 'In terms of human resources, things like keeping lesson observations etc. I *monitor the newly qualified teachers and student teachers*. I can do that with the use of *ICT, monitoring and record keeping centrally* from *my office computer*.'

Most heads of department, however, expressed monitoring as being one of the most challenging aspects of their role because it destroyed '*trust*' and was perceived as essentially flawed. As, Micha$_d$ a head of English explained, the premise on which performance management of her team was based and expressed, namely student assessment results, '*is basically inaccurate*' because '*your outcomes are quite invariable whereas each cohort of children contains so many millions of variables.*' Consequently, she felt considerable internal conflict when upholding systems in which she had no confidence and in highlighting issues of which her colleagues, by virtue of being professionals, would already naturally be cognisant:

> 'That's the thing that I *personally find most difficult, managing your teachers' performance by results of their pupils*, so it sits slightly *uncomfortably* with me to look at the *data from other peoples' classes* and say look I've *analysed y*our classes data from the last *controlled assessment* and actually half you're class aren't achieving their MEGS and we've got to sort that out and so why aren't they achieving their MEGS *so what are you going to do about it.* It feels *intrusive* and also I think it can be a *damage of trust.* I think people feel well its my class why are you looking at their data. It can give people the sense that you don't trust them to identify that themselves.'

Departmental vision conflict.   The introduction of ICT, I suggest, with co-ordination implications (for budgets, equipment obsolescence etc.) has necessitated the development of increased whole school centralised strategic planning (on annual or five yearly bases) which often conflicts with both the more subject-orientated plans and vision of the departmental head (restricting a traditionally pro-active and manoeuverable stance) and their customary departmental collegiate working style.   Findings also paralleled in Gleeson & Knight's (2008) research of middle managers in Further Education colleges. Evidence from this study supports Brown's (2000) earlier identification and Bennett et al.'s confirmation (2006) of the leader's twofold frustration in having to subordinate subject departmental vision to that of a whole school focus of senior management and to find consultation and collegiality replaced by direct instruction (via a line management culture and associate hierarchical framework), leading to feelings of professional judgement being undervalued and insufficiently recognized by senior management, governors and external bodies.

Although Bolam & Turner (1998) observed a non-compliance response to unwanted 'interference' in UK schools (over two decades ago) in the 1990s, this option is more realisable in the relatively autonomous classroom situation than with respect to the communication and practical translation of school policy at the departmental level, where enforced compliance generates internal personal conflict, as articulated by Nick[a]:

> 'I mean I hope the departments I ran were *collegiate and collaborative* and that things were *discussed* and that decisions were reached through agreement, rather than literally *edicts* from me *coming down.* But I mean in many ways the *role* of a *head of department* was becoming *harder* because you were under so much *pressure* then *from management to do various things*, but very hard to sell if you don't *always agree* with it.'

The anxiety expressed by several middle managers at the perceived demotion of subject interests to whole school ones was, however, surpassed by concerns over the deterioration they recounted in departmental staff welfare. The value conflict between middle mangers who credited allegiance and accountability to their departmental staff as a primary aspect of pastoral responsibility, in contrast to their perception of whole school management increasingly 'alien', authoritarian and '*inhumane*' stance was the source of considerable internal 'strain'. As summarised by Andrew[a]:

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I think that was one of the *biggest strains* there was. Senior management, although they'd obviously all been teachers and many of them heads of department, *doesn't mean that they were good managers*. They also seemed to *forget when they got promoted what classroom life was really like*. I think their *first loyalty was to the management* rather *than to the department* and I think there was a conflict. As a head of department I think *you've got a pastoral role to play,* whereas I'm not sure that they necessarily saw the *role* in the same way. I'm not particularly sure there was concern for the *welfare* of staff and I think there was a *massive conflict.'*

Departmental administration and time. Embedded in several commentators analysis of teachers and ICT is a simplistic deterministic assumption that technology has the ability to transform the educational experience for them in a *beneficial* way (comparable to the revolutions in business and industry); that technology's potential can overcome long-existing problems and limitations at the core of the educational process, despite the latter's obvious socio-economic origins. One aspect of the teacher's job that commentators (often ignorant of its specifics) unequivocally argued would benefit from the timesaving, efficiency aspects inherent in technology, was administration. Haigh (2007) referenced technology in this capacity as the 'teacher's friend' and Selwyn (2011a) cited its ability to free up teaching time via workload reduction in monitoring learning progress and managing learning materials. Many commentators, however, employ such evidence to contrast a perceived discrepancy between teachers' ready (and skilled) use of personal computers, and the 'failure' of its prescribed use in the classroom. Whilst recognising the widespread use of digital technology in administration, it is still regarded in terms of low status; as usage that reflects mere continuity of processes, rather than engendering innovatory, enhanced or changed practices and opportunities. Selwyn (2011b), for example, suggests that it is still employed for the daily, unchanged processes and practices of formative/summative assessment, reporting and monitoring.

Contrary to my expectations, this study elicited a genuine appreciation by heads of department of the analytical scope offered by digital tools (e.g. spreadsheets and databases) to organise, store and analyse trends which is now a mandatory administrative task. As one relatively young head of English, and self-declared, 'ambivalent' user of technology, Micha$_d$ concedes:

> 'With data *it helps, it really helps* to be able to look at everything and not have *millions of bits of paper* and *keep track* of it very *quickly* on the *computer.*'

In addition to the efficiency improvements inherent in paper and storage reduction, rendering '*organisation of the 'paper trail more accessible',* one head of mathematics, Michael[b], judged ICT-enabled processes to be more significant than merely addressing the mechanical aspects of the '*paperwork challenges'* which accompanied managerial administration:

> 'Not only is it *more efficient* with *less storage problems*, but also..there is *new potential. . ..*We can get the *analysis and look at trends* in a way we couldn't *before.*'

Similarly, a head of biology, Emily[c], whilst recognising the ease of data comparability, also identified the novelty of this technology-based usage in terms of adding a relatively '*new'*, non-replicating and welcome dimension to a regular task:

> 'We'll still using *very standard packages* so in terms of *analysis* I use *Excel* still to do any *statistics* I would normally do. Simple things like working out *averages, standard deviations* that kind of thing I would use Excel. *I've done that for years…* I have changed the way I've kept the data but the last 3 years its been fairly consistent. So for the last 5 years I've got it in the same format so the *data is comparable.*'

Indeed data collection and manipulation for individual students was generally considered by most heads of department as representing genuine progress from past processes and procedures:

> 'So *for every girl within the school* I've got her progress from year 7; what her entrance exam was, what are her MIDYS exams are, what her first assessment was, her end of year exam. That's all there at the click of a mouse and that's great. In the *olden days* having to *search* for this, I probably wouldn't have been able to do it as effectively. So that is *really good.*'

However, the uneven result of technical fixes for different populations and negative implications, (rarely addressed in the literature) whereby one social problem may be replaced by another, was also evidenced in this study. By circumventing the limitations of short-term focus (Selwyn, 2011a) which often leads to an under-estimation of the former (by employing interview parameters which encompassed a lifetime's career) and providing an opportunity for balanced participant reflection and evaluation, several negative unforeseen consequences were identified.

One such consequence was the limited freedom of choice or discretion identified in whether (and how) to employ ICT administrative procedures, since in most schools they had become mandatory and inflexible in application. Although such practices may well reflect a perceived 'fitness for purpose' role in the office-based situations (for which they were originally designed), their universal application for education tasks is debateable. While appreciating the use of accessible centralised data, for example, Micha$_d$, also queries the rather impersonal approach to analysis that this both engenders and encourages; reducing individual students to a composite of quantitative analyses and concluding that more complex, less restricted, information (as opposed to student 'data') might be more effectively obtained by face to face discussion in traditional verbal communication:

> 'For things like analysing data and keeping track of vast amounts of data which we do need to do, I can understand having *single sources* where *everything you need to know about a child* can be there. Like do they have SEN or EAL, what Key stage 2 levels did they get? It's *very helpful* to be able to *click* on a child's name and have a much *better picture* of who this child is and what they're like. *On the other hand* though wouldn't it be nicer if you actually *said* to the *children in your class* right we're 2 weeks into the year now its really *important to me that I find out a* bit more about you all, so at this stage in your library lesson you're all going to come and *sit with me for 5 minutes* and I'm going to ask about what's going on with you. How much do you read? What did you get in your SATS? *Do you think you're* struggling with anything? *What language do you speak at home?* What language do your grandparents' speak? Do you feel *you're as good at reading* as the other girls in the class? ..I wonder if *one is better* or they're just as good as each other?'

Another key consequence centres on the issue of ICT and time. Insufficient qualitative investigation has occurred in secondary schools which evaluates the extent to which time has actually been saved by ICT or whether administrative tasks are absorbing a disproportionate amount of finite work time (and energy) at the expense of teaching commitments (including planning and teaching). Whether for example, the high quality of professionally published reports demanded (together with time consumed internal checking and proof reading processes) and the depth of data analysis requires more, not less time to produce. Some academics have suggested for example that any technology simply aids the multiplication of tasks, facilitated by the greater capacity digital technology offers to carry out more, (and new) diverse activities. In sociology studies Wacjman (2008, 2015) has drawn attention to such effects, developing

ideas established by science and technology historian, Schwartz Cowan (1997). The latter identifying the capacity of ICT in general to generate new tasks and to intensify existing work patterns by changing the nature and meaning of work activities in an increasingly rigidly organised day, often creating new material and cultural practices. Evidenced in this study by expectations of a professional standard of all publication, despite as several interviewees noted, limitations in personal proficiency in word-processing and database skills including work speed.

This research in conjunction with personal experiences (Barker, 1999) and observations confirms the exponential increase in the time devoted to ICT-based administrative tasks in schools, via the compulsory use of word processing for written communication, databases and spread sheets for data-analysis and data inputting for assessment recording, all orientated around the organisation's internal intranet. As observed by Emily[c], the increased time spent on report writing is in part also due to the perception that high quality necessitates quantity (in comparison with a past brevity) in order to circumvent the (unforeseen) in-authenticity that word-processed commentary has generated:

> 'So when I started teaching *15 years ago* our reports were *hand written* and you probably could write *3 lines on every student* and because it was hand written they felt they had something *individual* to them but in fact you got into your flow of things and you'd comment on maybe 3 things that the child had done and probably reports were quite similar. *Nowadays because people suspect you copy and paste* reports you *go above and beyond* to look at the data you've got for the girls. I've made *lots of notes on individual* pieces of work and *I feel I've got to have that to make it individual* as well and then I've got to *remember she*'d said something in class *so I've* got to put that in too. When I came here I can remember I would do two sets of reports in an evening so it would take me 2½ - 3 hours per set. Now it took me an *entire day to* do one set. That's actually for this year group, last week, took me about *8 hours because* I was looking at so many bits of data all over the place and then *trying to word it beautifully and to* write a quite big paragraph, all individual to the girl, so … that took *me absolutely ages*.'

Tom[a]'s observation, highlights the difference between perception and reality when comparing the time devoted to report writing with its actual appreciation by parents in his school, having introduced a system of forwarding reports electronically which revealed that:

> 'Apparently only about 60% of them are opened which is remarkable. It actually shows how much they are valued for the time that goes in to them.'

For several heads of department interviewed administrative tasks were

increasingly identified as being both disproportionately time-consuming and inappropriate to the service of higher-level teaching and managerial tasks. A trend established by Apple and Junck's (1990) studies which revealed a growing dissatisfaction with the prioritisation of low level administrative tasks over higher level teaching ones, whereby technologies were perceived as coping mechanisms for increasing temporal pressures and getting (compulsory administrative) 'work done' was substituted for (teaching) 'work well done'. One head of department, encumbered by multiple commitments (including the consequences of staff illness) highlights the tension created between her own self-identity as manager and her organisation's one which demands her responsibility for the growth of ICT-induced administration. Moreover, by portraying her organisation's expectations as irrational deviation from normal business practices, (whereby lower level non strategic tasks would be delegated to secretaries leaving more strategic tasks to the 'manager') Micha$_d$ highlights organisational disunity:

> 'I've had a much *busier time-table* than normal just because of some *staffing issues* so normally I've had six possible periods I'm teaching for normally four or five of them, lets say *four and a half hour's of teaching* versus *one and a half hours of kind of admin and lesson planning.* But if I've got to be honest the one and half hour's extra is normally just *answer that data email, deal with peoples' questions.* That sort of head of department stuff and you're got your *own marking and planning and meetings, writing reports and entering data and other things you get asked like development plans and reports to governors and all that kind of extra stuff* …so all that adds up as well. So it can start to feel like you are doing *the job of three*, well you're *doing bits of a million different jobs.* Some of it could *go to another person* maybe like someone who does *admin* or *puts up displays* or who looks at *your data* for you and says ok I've *identified* this, who *checks reports* for you like something that isn't *strategic* but is necessary which I think, …in other organisations you feel like it *wouldn't be done by a manage*r or the manager would have *someone else to help them* to do it but I think *schools don't* work that way really.'

The teacher union representative interviewed in this study suggested that such interpretations were widespread, citing technology-based administration as directly responsible for both overwork issues and as determinants in contemporary teacher shortages and poor retention levels amongst young staff, as Richard$_e$ observed:

> 'Now teachers *spend ages processing and inputting* data even though this should be done by *support staff*.'

Evidence suggests that some experienced heads of department have become more

cynical with time, based on their perception that much data analysis serves no education purpose, as Robert[b], a head of humanities articulates:

> 'Some of it you felt was just *done for the sake of* it because nothing then came from it.'

Moreover, if such cynicism is left unchecked, Andrew[a] suggests that it can contribute to decisions, as in his case, to leave the position entirely:

> 'I think that was *part of the reason I left the classroom* and came into a different element of education. It's become more *about paper pushing* and I think *everyone would say that these days*. Paper pushing whether *in the digital sense* or whatever and being required to produce *evidence of everything* that takes place, produce a paper trail.'

Communication. Central to successful team management is the acknowledged role played by effective internal communication (Handy, 1999). Little research, however, has been conducted into the extent to which new patterns of contact, expressed by email and social media, have affected internal and external relationships and work time. Whilst collegial interaction and collaborative support continues to be emphasised as a factor promoting technology use and innovatory practices (Hasseler & Collins 1993; Becker 2000) this research (personal experience) evidences the decline in activities which facilitate 'face to face' engagement (particularly departmental meetings). Moreover the reflective and mutual learning opportunities provided by traditional continual professional development programmes have also been increasingly 'relegated' to the online provision which schools find both convenient and cheaper to fund as previously discussed. Several middle managers regretted that they no longer saw colleagues teaching informally and that departmental meetings had become less open and flexible; driven less by self-initiated departmentally led (pedagogical) agendas and more by formalised ones, dominated by whole school issues and prioritising formalised quantitative target setting, as expressed by Robert[b]:

> 'When I started teaching in 1987 I remember the first thing existing teachers did in September was to *discus*s the exam r*esults*. They looked at which *students* underachieved or obtained better than expected results. This was *used to inform future teaching*. It was *not formally recorded*. Now teachers do the same but it has to be *recorded* and *targets set*.'

All interviewees considered communication developments, particularly email, to be one of the most significant changes in their professional work

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patterns. Several aspects of which were assessed positively. The ability to be in regular contact with colleagues and to access experts via conference facilities was considered useful (particularly on split sites) and security inducing as expressed by Evelyn[b], a head of English who felt rather '*isolated*' in a large school without email communication. The paper chain process ('*leaving requisitions in staff pigeon holes*') necessitated in more traditional systems was also criticised in contrast, as slowing down key decision making processes. The ability to mitigate problems of UK teacher shortages by conducting job interviews (in digital format) long distance, was crucial to Justin[a] as assistant principal for the effective running of his school:

> 'I've done a lot of interviews recently *over Skype*. People who are in *Australia* or *Canada* or wherever else and *not physically* available *to talk.* So I have interviewed over Skype. It's a *formal interview*, but based on just a *video interview*.'

However lack of regulation in most schools, coupled with uncontrolled access by parents and students to heads of department and their colleagues via email has produced severe overload problems. Emily[c] articulates how having to action email quickly and from new external sources has become effectively an added duty:

> 'It actually *adds another job* in some ways because we have *so many emails*. I can remember probably back 11 or 12 years one day receiving *10 emails* and saying to my friends after work. My goodness I got 10 emails today that's *incredible*. Now in a day I would probably receive *60 or 70 emails*; quite a few of which require action. That can only be done *in your own time really,* so it does add a lot. And plus, we have *emails directly from students* and *directly form parents*, which really do require *swift action* a lot of the time.'

An e-learning director, with holistic school perspective identifies multiple problems which lead Tom[a] to conclude that overload has now rendered the email system no longer fit for purpose:

> 'We're getting to a point now where we are at *email saturation* I would say. As a school the email is becoming i*neffective* because there *is so much of it* and we are having to develop *new ways of communicating* because of it. We did a study, checking, the school on a single day had received something like *17,000 emails* and people become *totally inundated* with the number of emails they have and people *don't really have strategies* to deal with it and there is an *assumption* that because I have sent you an email, that's done and *parents email a lot*. They really appreciate the opportunity to be able to communicate that way. We will often get hundreds and hundreds of words from an email, whereas *a phone call* would have been much more *effective* and because it's a *one portal* for

everything you'll get reminders about Christian Forum or a lost bag; just a huge *deluge of emails* that people aren't used to dealing with I don't think. So in lots of ways its losing or has *lost its effectiveness*.'

Susanne_d explains the problem in terms of the ease by which (multiple) emails can be sent and restrains herself from quickly '*bashing' them off*', suggesting that they are often used for inappropriate purposes *('when a quick chat in the corridor would suffice')* and when often a 'face to face' discussion is required (although observing that some email is used distinctly to avoid such confrontations). Since, however all email is usually tracked, as some heads of ICT emphasise, it serves as an internal tracking and evidential trail device for the more legalistically orientated organisations.

A significance and unforeseen dimension of electronic communication is as conduit, (beyond simple communication) to specific pedagogical and managerial work related tasks. Several mangers linked increased workload to the development of school portals and to the breakdown of a separation between the home and work environment, encouraging assumptions that staff are available throughout the day to respond to external communication. As, Robert_b, a head of faculty observes:

> 'A lot of those email communications happen *out of hours* as well. And now there is almost *an expectation of being available*. You will often have *parents emailing in the morning and expecting an answer by lunchtime* kind of thing and some of them get most *disturbed when the response* they get from whoever is taking the call is, well I'm sorry Mr X has been *teachin*g and therefore hasn't *got back to you*. Well they've been teaching and therefore they are not going to get back to respond to your email. So the *level of expectation* has changed as well as the type of *communication*.'

Since the institutions which traditionally protected staff welfare; primarily trade unions, have become disempowered ('*emasculated*') or senior leadership is complaisant, ignorant of ICT consequences or uncaring of staff welfare, as Owen_b head of religious studies observes, middle managers have no effective protection from an exponentially increasing workload:

> 'Because people are *more easily accessible*, because *some jobs are quicker* by using a computer; *almost an expectation*, you will *plough through more work*, particularly *at senior level*. If l*eaders* don't have an *understanding* of what's required, *unrealistic expectations* are made that it '*can just happen approach*'.

Off-site working patterns. Insufficient time to complete more tasks, generated by ICT, is a theme identified in the literature related to middle

managers and 'burn out'. That poor retention and early retirement has intensified despite the introduction of technology designed to promote the saving of time and efficiency raises questions concerning the dynamics and actualities at the point of usage. This study evidences the growth in off-site working practices, in consequence, to an extent far beyond the culturally acceptable lesson preparation activities. Whilst Brown et al. (2000*)* and Glover et al. (1998) noted that much of a departmental head's increased supervisory work necessitated being completed *on site* in the early 2000s*,* such as 'monitoring, observational, evaluating, coaching, reflection and reviewing tasks' (Brown et al, 2000:250), new ICT whole school managerial systems (such as (Remote) School Management Information System-(R)SIMS) render even these activities achievable now from home.   Technology has facilitated the circumvention of normal working hours, with most staff having 48 hour access to the school website via mobile technology and the Internet.   While acknowledging some personal benefits Owen[b] as head of faculty articulates the welfare concerns for his colleagues facilitated by external expectations:

> 'Although the ability to *work flexibly is helpful* …I *don't think its helpful* for colleagues *who have young families themselves* and the level of expectations from parents, I don't think its helpful to them.'

The widespread and increasingly mandatory employment of word-processing, database and spread-sheet programs to complete time-consuming data entry, analytical and publishing tasks (e.g. examination entries, assessment analysis, report writing, schemes of work, department handbooks) together with the demands of new monitoring and teacher assessment software, are all activities which due to time poverty most middle mangers interviewed complete off-site. Moreover, the disproportionate amount of time spent on tasks essentially of a secretarial nature and observed as such by Glover as early as 1998, is identified as a cause for concern, at least within the Scottish educational system. As Justin[a] a recently promoted assistant principal notes:

> 'I've been spending *more time working from home* but even with *teachers* who haven't had a changing role, I think they do *spend more time working* there. I think ..over the last couple of years in particular we've *had web-based portals* that enable us to *acces*s RMIS from home and that means that there is *less demarcation between personal and work time.'*

Several middle managers also attributed their lengthening working day, including the loss of previously sacrosanct weekend and vacation time, by direct reference

to ICT facilitated student demand and access (help, marking, etc.). An expectation which failed to be managed by most organisations, SMT and teacher unions, as Andrew$_a$ articulates:

> '*Holidays* mean nothing. *Weekends* mean nothing. Students have *constant access to you*. The ones who are very keen come back with; 'I can't do this work. This is my homework. I can't finish it. Can you go through it and so on?' Whereas in the past the homework would come in, then you'd give the feedback with everybody else's in class, now you've got to give feedback within *24 hours or even less via email*.'

Middle managers and teaching

The second major aspect of the subject head of department 's role is that of exemplar teacher and specialist; teaching commitments taking up approximately three-quarters of their daily timetable. A theme still dominating much academic literature, however, is the teacher use of technology expressed in problematic, rather than actual terms. Despite a substantial evidence base which supports positive teacher use and higher confidence levels, learning improvements and improved student motivation (Barker & Gardiner 2007; BESA 2009; Trucano 2005; Condie & Munro 2007), a significant body of data and research findings throughout the 2010s (Becker 2000; Madden et al. 2005) conclude that despite the physical presence of digital technology in schools (discussed in Chapter 5), the technology led 'transformation' of education has failed to materialize. Schools have been criticised for offering little more than a facsimile of the 'real world' (Bigum & Rown 2008: 249), with tangible benefits remaining illusive; leading to what Goodson et al. (2007) refer to as a 'more producing less notion', in which the abundance of technology has resulted 'in a lower quality of learning' than might otherwise have been expected or in 'mis-learning, frustrated learning, confused learning and so on' (2002: 138)

Digital Natives myth. Such interpretations have often been reinforced in the literature through the conceptualisation of the theory of digital divide, expressed in a growth in tensions between the central student- teacher relationship based on a perceived dissatisfaction voiced by young students with what is considered to be the outmoded antiquated educational methods of their older teachers. Despite academic (Selwyn's 2009) critiques of the youthful digital native student, as innate and talented users of technology (articulated predominantly in US-based commentators) as unfounded on empirically grounds, several empirical studies in the UK, continue to evidence students disgruntled by

inadequate use of technology by their teachers (Williams, 2008). A noted feature of all interviews was the clear prioritisation given to this, educational aspect of the job (exemplified by an overriding preference to discuss students and pedagogical issues at length) over other managerial and administrative duties (including working conditions and colleagues' welfare.).

While the extent to which heads of department considered that their students' behaviour had fundamentally changed was mixed, none felt pressurised to employ technology due to student expectations in their capacity as 'consumers of education' as argued by Plowman et al. (2010) and Palfrey & Gasser (2008). Indeed, while some managers were influenced by their more digitally proficient peers to replicate a particular engaging lesson, more were pressurised by examination-orientated parents to employ more traditional methods of teaching (as discussed in chapter 6). As Tom$_a$ an e-learning co-ordinator observed, his students were increasingly complaisant about the use of new technology:

> 'I would have *imagined* there would have been a huge *excitement* about it, its just the *normality*. You'd think that when a kid gets an iPad or something, they would be *pleased as punch* and they are for a little bit, but the *novelty wears off very, very quickly* which *I was surprised about*.'

Several heads of departments who had conducted internal research with students, cited feedback, identifying consistency of marking as more important to the former than use of technology. Moreover, some students had expressed concern that technology was actually overused and while there was a clear preference for some work to be word-processed by students (95% cited by one head), in high achieving schools, the priority of senior students (as Tom$_a$ expounds) was pragmatically displayed as ready utilisation of techniques if those were perceived to secure the university entrance goal as previously identified by Selwyn (2011a):

> 'They are very *focused on university entrance*, almost to the *exclusion* of anything else. They will *do anything* to go through those hoops. If you told them they had to stand on one leg for a week they would do that.'

Although this research found evidence to suggest that both young teachers and some students were perceived as more '*confident*', quick and '*intuitive*' users of technology than themselves, theses attributes were more notably identified in younger users (years 7 and 8) than their older 6 Form equivalents (with some teachers citing the abilities of their own young children as Hilary$_c$ a head of music exemplifies when referencing her youngest students:

> 'They can do a lot *more impressive things* than I can. It's funny but even *kids* who've never seen the logic program or some other things that we use they have a way of *figuring things* out a *lot faster than I could*.'

However, several managers evaluated student ICT usage more in terms of dexterity than cognition, concurring that educational use of technology was a different category ('digital natives in using equipment' only). The latter's acquisition and deployment of digital skills was viewed as social usage; with general digital practices and dispositions 'facilitating young lives', concluding that the current generation's engagement with digital technology is more 'unspectacular' than supposed (Selwyn, 2009:). As, Graham_b explains:

> 'I think a lot of teachers still expect they have *higher kind of functional skills than they do*. They think *they're better* at organizing files or *understanding the system* than they are a lot of the time. They *don't have any concept of those things at all.'*

Some research studies have utilised the theory of information accessible to 'end users' to suggest that tension would also be created by threats to teachers 'authority as experts. Firstly, through the availability (via the Internet) of rival information sources and secondly, due to the emphasis on superiority of collaborative and peer led learning. The manner, however, in which data or *information* (as opposed to its interrogation) is so often misrepresented and overvalued as knowledge in the literature, is based, I suggest, on a misunderstanding of the very nature of teaching. Assumptions based on a prioritisation of subject *content* over (what is for most teachers a far more significant dimension of their work) *skill*s acquisition and *cognition;* dimensions often neglected by researchers. The equation of information with education is arguably consequential to the affordance of the Internet to supply a relatively 'reliable' access of resources and to a predominance in discussion of empirical research, conduced in the highly standardisation, content driven and assessment-based, American school system; both historically and culturally different from its British counterpart.

Although some heads of department did cite occasions when students used the internet to contradict them in class, as one head of biology, noted, the '*smart Alec'* was by no means a new phenomenon, but as a minor irritant who could '*derail a lesson for a bit'.* However, as Graham_b from his ICT examiner perspective explains, the effects are more detrimental at public assessment levels, when a '*Wikipedia mentality'* is persistently displayed by his students:

'It's *perfect if it's on the Internet*. Nothings *wrong* if it's on the Internet. We all know that don't we. And that's what *kids see*. You set a question and they go *straight on Wikipedia* because its perfect and when you say no that's not right.'well it says it here'. It's when they argue exam questions. When you've given them the answer and they say no, no, that's wrong I'm concerned.'

Although most interviewees noted that other criticisms of technology pertaining to plagiarism and 'cut and paste' had not increased unduly (often instigated by exam boards in the form of controlled assessment), a reduction in displays of extended written arguments, critical thinking, questioning of provenance, problem solving, qualities of independence and initiative (the majority of which were technology attributed) and problems stemming from information overload and information illiteracy were changes which elicited concern as observed in previous investigations (Barker 1999, Jewitt 2005; Jenkins 2005; Buckingham 2007; Withers 2008). As Micha[d] noted, the acceptance of internet sourced 'whacky theories' was prevalent even at Advanced level study, while, Ethan[c,] was concerned by the facility, offered by search engines such as Google book search (via key word searches) to decontextualize information and understanding.

Some heads of department did, however, recognise that the pressure to become overly supportive was not driven by inanimate technology and students, but by the demands of SMT to uphold high league table status, as articulated by Hilary[c]:

'I find there are more and more children who say '*Miss help me, hold my hand*'. The '*do it for me kind of attitude*' is a real problem ..because we're so *desperate* to hold on to the *great status* that we have. We get great results, but I think a lot is because teachers are *killing themselves* and *feeding the kids to ensure* that they all meet the levels and grades they're *supposed to*.'

Severe pressure on performance results, however, could lead to a SMT culture of institutional corruption and '*bullying*' as termed by Caroline[c]. Three managers (including Ella[b], an experienced public examiner, described how the opportunities provided by technology, enabled colleagues or students to manipulate coursework and to facilitate 'cheating', a term also employed by Chris[b], which ultimately resulted in all three leaving the school concerned or the profession.

Teaching styles and practices. Central to the issue of the continuity and conservative analysis of teachers by some academics, is not the administrative or managerial deployment of technology (which receives limited attention) but its

perceived inability to revolutionise teaching practices. Primarily, this issue involves overcoming what a discourse considers to be long-existing limitations of education, based on existing pedagogical practices; generalised pejoratively as didactic and whole class, rather than the preferred individual student centred, constructivist style, with the teacher playing a facilitating role (Somekh 2007).

The existence of traditional teaching methods which utilise pair and group work, individual tuition, and student presentation is usually ignored, reflecting a limited understanding of the complexity of the teaching and learning process, wherein classroom action is just one element, albeit a highly visible one. Although Dawes' thesis (1999) had attributed the lack of a basic understanding of the work that goes on in schools as responsible for the generation of the 'teacher resistance' myth as early as the 1990s, a body of literature continues to articulate the technologically deficient teacher idea with only an elite minority identified as enthusiastic users, (Selwyn 2010). Even in empirical studies where teachers are seen to utilise technology, it is perceived as inadequate because it continues to encompass, as Luckin (2010) argues, a restricted engagement with technology, based on a passive delivery of information via whiteboards and the bounded use of virtual environments and managed learning systems. By implication staff are criticised for a student use of technology which is equally observed as predominated by 'cut and paste' from online material provided by search engines such as Google, Microsoft word documents and PowerPoint presentations, leading some researchers to describe the development of a PowerPoint culture in schools (Reedy, 2008). The simplicity of such generalisations is countered by, Michael[b,] a head of mathematics, describing degree to which learning has changed from his school days:

> 'I think this is really *a work in progress*. You're going from *one model of learning,* the one we had where you *didn't really question*, *we just received*, so you're moving away from pupils *being sponges* where you fill them with information to opening that *dialogue*, so that the learning can take place at a *deeper level*.'

As anticipated, most middle managers, on reflective evaluation, described aspects of continuity in the main processes of their work; often drawing attention to the complex nature of change and differentiating between evolutionary and revolutionary dimensions in the process. As Nick[a, a] head teacher observes, you still '*go into 'classrooms, staff sets challenges, students respond'*. The ICT-

facilitated diversity of approaches within a fundamental continuity of process, is articulated by Liam[b]:

> 'I don't think its been a *revolutionary change* in practice**.** With noteworthy individuals excepted, the *use of PowerPoint* is essentially the same *pedagogical approach* in a lesson to using a chalk *board or whiteboard.* So I don't think that has made a particular difference *over the course of my teaching career.* I think what's happened has there's been an *extension in the continuum of practice.* So there is still the same kind of *traditional approach* that was *manifest in many classrooms when I started teaching.* What I think *technology has done* is to make *available all the alternative approaches* and that has *extended the scope of possibilities* that teachers can buy into should they *so choose.* So I would guess that on average there has been a shift to a more *innovative approach on average* but there is still an awful lot of the *traditional approach still prevalent in the majority of classrooms.'*

However, the balanced (acknowledging limitations) response, across all age groups and mangers interviewed, was to perceive ICT enhanced change in their teaching role as highly positive. The language employed (*'tremendous', 'revolutionary', 'enormous change'*) in the interviews suggests an acknowledgement of genuine transformation. As Emily[c], a head of biology, reflecting on the development of educational technology over her career observes enthusiastically:

> 'It's just grown so much and its made things *more exciting.* Even 15 years ago when I started teaching, I think teaching was still the same way that it was in the *1950s.* But the last *15 years I feel everything's changed.'*

Moreover, the conceptual depth of learning offered is considered innovatory particularly in design and technology, confirming Passey's (2004) earlier findings into English secondary schools, as explained by Tom[a,] a head of design and technology:

> 'I can teach things now *that I was never able to do before*; to *explore contexts* and areas that I *wasn't able to do so* before and because I teach design, the speed at which kids can design and make thing is unbelievable. So the *projects* they come up with are *radically different* to what they would have done before.'

A theme running through much of the literature is a naïve and deterministic acceptance of technology's ability to both transform didactic practices (terms often misunderstood and misapplied) and to develop student's higher level cognitive, problem-solving and thinking skills (lower level memory and spelling skills being subsumed via automation,) while omitting a discussion of the methods by which this is to be achieved (particularly with office orientated rather than subject specific software and most students without personalised,

class-room based devices), or to comment on the significance of the absence of any valid evidence to teachers that such learning would indeed occur as predicted and in a classroom, as opposed to a research laboratory. The coincidence of constructivist and collaborative learning theories with the neo-liberal, individualist, choice orientated society from the 1980s, which arguably enabled digital technologies to be presented as tools to deliver individualised, differentiated learning (Scardamalia & Bereiter 1994) as opposed to the passive recipient of 'knowledge' style, has also been under-examined. However, this research shows, surprisingly, that no head of department interviewed was negatively influenced by the lack of evidence to support learning and improvement as summarised by Ethan$_c$, a head of history, referring to governmental evidence:

> 'There was a justification at all around *engagement*… around 'this is preparation for the *modern world'*. These are devices and ways of working that will be important to *young people in the future*. I don't think many of us were sitting down and thinking well *what proof do* we have that this is going to make a difference to students' achievement because we felt that *we could automatically* see what difference it would make.'

Pedagogical issues Arguments that teachers could be making judgements on principled, pedagogical lines not to use inappropriate technology have been largely under-emphasised by researchers, although the importance of specific teaching theory to practice is well-establish in educational literature (Bruner, 1996). Evidence suggests that they remain unvoiced within more public school forums (as opposed to departmental) through an internalised self-censorship, with some managers (self-described as *Luddites*) expressing a reluctance to engage in open debate on pedagogical issues for fear of ridicule or of being discredited as un-progressive or outmoded by a senior management (perceived as valuing constant educational change). Indeed this research found that school IT co-ordinators (in various guises e.g. e-learning, ICT director,) while carefully emphasising (in politically correct language) a supportive policy for the novice technology user, employed stereotypical labelling to describe individual non-users ('*refuseniks'*, '*antis'*, '*slow adopters'* or '*stubborn'*) and to present selective and subject specialist discretionary use of technology in terms of irrational, misuse and ignorance (*of full potential*), often categorising whole departments in disparaging terms (e.g. English, art, classics) and suggesting that these teachers are still perceived in deviant terms:

'*English* are *hugely anti-IT.* Which is *funny* because they do things like blogging but they *don't use something like 'blogger'*, so they will *literally type them as a word essay and never publish them*. English *seem to say* they're the one that it *doesn't fit* with them. They really *can't teach* English using an *iPad*.'

However, the effects on the power of individual heads of high achieving departments to override and ignore negative school perceptions of technological inadequacy, if accompanied by shifts in the political educational climate (e.g. Education Minister Gove's emphasis on more traditional values and curriculum) and the dominance of examination-led league table assessments (the priority for head teachers) is recognised as a significant development by IT co-ordinators (whose role by definition is to encourage ICT usage).   While some IT co-ordinators rationalised the new power dynamics in pragmatic terms, others such as Chris[b] articulated a disdainful surprise that middle leaders should take an actual *pride* in non-enhanced technological educational achievement, articulating a perceived polarised technical versus academic division:

'I think people who don't use it *are sort of proud* of not using it in a way and they think of *themselves as academics* who don't *really need this...* We've always done it like this and that's the way we're going to do it. We get *amazing results* and some of them *teach A level*.'

This research counters such generalised views of subject culture and confirms Watson's previous assessment that the deficit model of teachers is misconceived and that ICT is used when it has a 'particular resonance with their pedagogic and subject philosophy' and that those who do not use it 'do so for sound professional reasons,' Watson (2001: 260). As Richard[e,] a head of department and union representative recalls:

'When interactive *whiteboard*s came in we had teachers *being criticised* for not using them, or not using them enough, when the teacher had made a *judgement* it was *not the best tool* for that bit of teaching. e.g. students can be shown a *video clip* of a science experiment, when it is far better for the students to either carry out *the experiment* themselves or at least watch a *demonstration.'*

The reaction of interviewees across the curriculum spectrum suggests a more complex interpretation and application of technology is being employed by teachers, supporting a variety of approaches (e.g. independent and collaborate learning) to meet what they have traditionally perceived as the universally recognised diverse learning styles of students. Moreover, the transition to a less constrained, more discretionary environment in some schools in 2016 has

facilitated the process as exemplified by the mantra, wielded as rationale (to both parents and teachers) by Tom[a] in an academic independent school:

> 'So our little phrase is we want to give every teacher every tool to teach how *they want to teach* and every student every tool for the *way they want to learn.'*

However, this sense of professional freedom was not universally acknowledged. In one academy, in contrast, technology was applied in a mandatory fashion to 'improve' unsatisfactory student results. Although one head of English employed *kindles* to promoting reading skills and to access a wide range of reading materials for mixed ability library lessons, she still felt guilty about not using sufficient technology in lessons which she considered should be discussion orientated. This view that technology in teaching is rather enforced and artificially integrated (and as initially anticipated a constraining element for teachers) is similarly observed albeit from a different perspective by Abigail[c], an experienced e-learning co-ordinator:

> 'I don't think yet they've come to the realization that technology isn't a *tag on.* Its very much *..how can we fit the technology around* what we're teaching? Rather than, is there a tool or technology that is going to assist us to teach a certain outcome?'

Overall, most technology was described, often in superlative terms ('*incredible', 'fantastic', 'brilliant', 'transformative', 'bonanza')* by heads of department, expressing its capacity particularly via interactivity, to facilitate ('*honestly*') one of the most challenging aspects of their job; '*real differentiation'* ('meeting every child at the point of their need') and enabling '*genuine* 'more personalised learning, albeit via the 'generation of' personalising printed worksheets, '*at the click of a mouse'* in mathematics or accessing a '*breath and variety of authentic'* digital resources in modern languages.

Whilst pedagogy was considered to be the primary issue for heads of department in technology deployment, many considered that their teaching methods had also changed as a consequence of new technologies leading some to greater personal 'reflection on the whole process of learning', including running many internal pilot schemes and analysing student responses. Andrew[a] expressed how technology encouraged him to become a 'life long learner in addition to a *enabling* and engendering a methodological *shift* in his teaching:

> 'For *me personally technology was revolutionary.* It enabled me to do so many things that I *hadn't been able to do in the past.* It did bring *about change within my classroom* in the way that I *organized the curriculum.* I

moved from at the start of my career, being a *very teacher oriented …*and certainly now I'm very much more *focused on the learner* and the way that I enabled them to *learn rather* than I *teach them. ..*and *technology was responsible for that* and it became possible for me as a learner to learn in different ways and that influenced me as a teacher in thinking about what I did. Everything used to be very much teacher directed within the classroom and *technology enabled me to make that shift to allow* students to become more autonomous.'

Surprisingly, the negative discourse of the polarised ICT skills debate (low level knowledge acquisition and comprehension as opposed to the higher level order skills of analysis, synthesis and evaluation as cited by Passey (1999) whilst widely acknowledged in some subject areas was not a universal criticism amongst interviewees. On the contrary Oliver[b, a] senior head of mathematics, emphasises how technology has enabled processes such as rotations and transformations (previously difficult to visualise on a whiteboard) to be grasped by using two dimensional manipulation of graphics 'in real time' via an *interactive* whiteboard rendering explanations of:

> '..enlargement, three times more understandable to you average year 10 student. So it's certainly *transformed* how I've taught certain specific topics in mathematics and made it more acceptable to a much wider range of pupils and that's significant. I hate the phrase *killer app* but its one of those sorts of things you could do with tech that simply wasn't available *before*.'

Whilst several mathematicians concurred that *'technology enables access to deeper concepts faster'* due to the elimination of more mundane and tedious calculations previously completed via log tables as Daniel[b], a head of mathematics explains:

> 'You spend hours teaching them to *draw axes*, you spend hours getting them to work out the numbers right, by the time they get to actually draw the nice curved line they've *lost the will to live and any possible higher level learning* went long, long ago and what the technology allows you to do, is it enables you to *cut to the chase and get on with discussing the mathematical object* and then doing things that are interesting with it without getting bogged down in the technicalities which you can then teach later.'

This research suggests that middle managers generally welcomed educational technology in their teaching when it was deployed at their professional discretion, not only in the widely recognised motivational and engagement capacity (Passey et al. 2004) but in its ability to 'deliver the content of the curriculum in a far more

exciting way' and for sound pedagogical reasons.   As Emily[c, a] head of Biology in an independent school describes:

> 'I *love using technology* not just because its technology, but because it really *opens doors for us*. So many things that *we can do now that we couldn't do 10 years ago.* So I feel very positively about in and my department are really *embracing every aspect of technology*.'

Evidently, some teachers were now clearly ascribing, not only traditional motivational capacity (engagement, research and writing etc.) to ICT but recognising its internal cognitive aspects to learning (conceptualising, reasoning, analysing etc.), omissions identified as crucial in Passey et al.'s (2004) key ICT motivational impact study into (eighteen) English primary and secondary schools.

Pragmatic users.   Some literature has sought to explain the 'failed' outcomes of embedded school technology by interpreting teachers more in the role of rational actors; as pragmatic and strategic uses of technology (Gitlin & Margonis 1995). That continual change in education has been acquiesced to so readily by teachers has led some academics (Selwyn, 2011a) to attribute pragmatism as a motivational factor; use of ICT being not a question of individual deficiency, but more one of informed choice and good sense.   More significance has been credited to the complexity and varying facets of the job (a site of labour as well as learning), concluding that technology is utilized when it directly benefits and facilitates the discharging of its primary duties as reflected by Chris[b,] a head of history who explains his deployment in the classroom in terms of practical efficiency:

> 'I think many of us *didn't need convincing*. When we saw the fact that we could prepare a *presentation and show it on a projector* in our classrooms, *use* it *again* the next lesson, we didn't have to *write it all on the board* and *rub* it off and write it all on again. We didn't have to think about that, that was an *obvious* then.'

The benefits of adaptation and modification of resources, together with the innovation of interactivity are also cited by Jack[c] a head of psychology:

> 'In terms of the things we can do with students now in *interactive processes*, the information that we can send through *programs*, using clips; 'Moodle', 'spinbank' I can't see major negatives really, and on a day to day basis, when you're planning lessons, the sort of things you can do now that you couldn't do before; *the changing of lessons where it literally used to be sort of hand written lessons putting them on the OHP, you can modify t*hings and clearly you can use 'YouTube', so the *quality has improved lessons*.'

For several middle managers access to high quality in house resources which could be '*shared by all colleagues, NQTs in particular'*, was considered a major benefit since much commercial software, (excluding foreign language) was generally derided as inadequate (e.g. '*not good quality'* even in terms of content, '*not inspiring'*).   However, any pursuant standardisation amongst departments in teaching was viewed critically.   Most interviewees stressed the creativity and innovation of their staff who were expected (and preferred) to explore resource and manipulate them to personal and class needs as appropriate. As Emily$_c$ explains:

> 'We are a very *creative department*. And its part of what we really *enjoy* doing is finding the *best resources* and *making our own*.'

That lesson preparation with technology, in theory, was viewed as an expertly individualised, rather than as a constraining process, is articulated by Daniel$_b$, a senior teacher:

> 'I think if you take the *expert practitioner* view you are never going to get anything that doesn't need *tweaking*. If you are doing your job as an expert practitioner and *making judgements* as we are supposed to do about current levels of attainment in my class in detail. I'd *expect our staff members* to do that. I take quite a *dim view if I walk* in and you know there's a whole corridor of kids looking at the same PowerPoint presentation. Bloody hell. What, you're really got 120 identical children? You can all learn this in the same way and access a set in the same way?'

A more sophisticated understanding of teacher's duties is reflected in Ball's (1987) reference to practical survival priorities, such as discipline maintenance, instruction of heterogeneous learners, achievement of examination grades, internal assessments and the meeting of the varied needs of stakeholders; school managers, parents and students (discussed further in Chapter 6).   Cassidy (1998) has equated the failure of technology assimilation with its inability to accommodate issues of time, content and relevance to the curriculum; views articulated earlier by Tyack and Tobin's study (1995) which concluded that teacher 'resistance' occurs when tactical and habitual decisions perceive technology to be of negligible benefit.

A similar interpretation is offered by Lankshear & Bigum (1999) who suggest that where there is a perceived congruence of 'good fit with the job, technology is used and that complementary and workability is the constant guiding element in teachers (non) use of technology. One under-assessed aspect of the job to which Muffoletto (2001) draws attention, is discipline and authority

maintenance; both crucial to the contemporary teacher's survival. He argues that some aspects of Internet applications and usage are directly influenced by teachers' concerns over a need to maintain authority relationships and that much research neglects the importance of classroom management logistics in assessments of ICT.

Departmental heads, in this study, confirmed the intensification of such concerns. Emily$_c$ described lessons as *'lost'* with *'disruption'* or *'panicking'* engendered if technology failed while, Owen$_b$, a head of humanities, observed that no form of *'risk-taking'* could be afforded by either NQTs or experienced teachers under the prevailing inspection, monitoring and league table assessment culture. Where technology might be seen to improve discipline, however, as with engagement, it was deliberately employed, as two illustrates reveal: one from Daniel$_b$, a head of mathematics who asserts; *'I can deliver the content of the curriculum in a far more exciting way'* and another co-ordinator, Tom$_a$, describing the discipline improvement pertaining to a whole academic department:

> 'So *our classics department*, their whole feedback is that they couldn't teach without it; there's a Cambridge Latin course on line and the *engagement* from the kids is amazing. They would be dropping classics for GCSE. Now because they are playing games and exploring the course on their own, I think they have almost *zero behavioural issues*.'

Consequently, criticisms of the widespread employment of technology such as PowerPoint (Reedy's 2008 ethnographic study of technology in UK secondary schools,) as distorting constructivist pedagogy to a presentational one, (despite a recognition of its discouragement of complex reasoning, thinking and writing) does not reflect the reality of the average UK classroom, as evidenced in this research whereby alternatives are limited. Several managers in academies described limited students access to personalised, portable digital devices with teachers constrained to working with a (mandatorily installed) computer and interactive board. Whilst some interviewees equated 'death by worksheet, with death by PowerPoint'; most cited the widely recognised motivational aspect of this digital device, with Emily$_c$, as head of biology, claiming it as the one ICT device *'she could not live without'*.

Adaptation of ICT. As suggested above, assumptions of free choice in educational technology usage are unfounded. This research, however, confirms, that the adaptation of technology by some individuals is a continual process, which occurs at all stages of ICT implementation, from national policy level to

classroom practice. As Philip[e], an educational advisor and ex BECTA (British
Educational Communications and Technology Agency) and NAACE
(National Association of Advisors for Computers in Education) employee
observes, strategic government policy, is readily circumvented on the ground,
when it is deemed unfit for practical purpose by teachers.   Although historians of
technology such as Nye (2007) argue that such adaption is a normal, creative,
human process, it is perceived as 'defection' in the former's recollection of how
Milliband's (UK Schools Standards Minister's) personalized learning platforms
initiative (2004), employing interactive whiteboards and laptops for teachers to
produce self-contained student resources, being '*distorted*' from its '*original
purpose*', due to inappropriate timing, design and support:

> 'The whole notion of the *learning platform* was *supposed* to make things a
> lot easier for a teacher prepare a load of *resources* to be there *for pupils*.
> But in the meantime if you've got to *write reports and lesson* plans, it
> makes sense that that's where you're *going to be using your technology*.
> The laptops for teachers scheme was intended so the teacher could *prepare
> really interesting lessons to deliver* through their interactive whiteboard,
> but of course all they did …was use a laptop to do all their *preparation on;
> their lessons plans* and marking,..I think that was one of the failures of the
> interactive whiteboard scheme. I mean ..that was a wonderful idea at the
> time, but it wasn't the right kind of resource and the right kind of support
> to make it happen.'

Most interviewees emphasised that the interactive whiteboard was never
used interactively as intended, largely because few were trained to use it, but more
significantly because of inadequate conceptualisation and impractical design.
Few teachers could utilise a single device, situated at the front of a classroom
without disciplinary issues with classes of thirty students. Consequently, it was
adapted for more appropriate use as a screen for projection, replacing the white
boards which had often been summarily removed. Another example reveals how
determined staff-led demand can circumvent centralised organisational structures
and practices as narrated by Steve[a] ahead of IT in an independent school,
expressing surprise firstly, at the unanticipated teacher instigated demand for a
device iPads and the extent that they could creatively, subvert normal budgetary
procedures. And secondly, at the infrastructural challenges presented for the
school's Wi-Fi network, since even the supplying companies have not foreseen
the consequences of mass demand, originally designing them for individual use
not for business:

'The staff bid for things in IT, so they *come to me* and they say they want certain things and they have a *book budget* for *everything else* and when the iPad came out so many members of staff started buying iPads from their book budget money, saying oh I really want one of those devices and I went to the *senior management* and I said this is just *ridiculous*, from an *audit point* of view they *shouldn't be doing this*, we don't know what specification it is. So we actually said *nobody's allowed to do that. If you want IT equipment come to the IT department.* Then *I had a look* and half the staff had got iPads. Well that's not *fair*. A small department that hasn't got the money can't have one, yet some science have given them to their technicians. So then we said we'll give every member of staff an iPad. So *that really came from the teachers, they chose the device, we* didn't chose it. We just said we want this to be equitable; everybody's going to have an iPad. And *Apple* had no idea that iPads were going to be used in education. A lot of it was *not designed for business.* Only recently did they have *volume purchasing for apps*; it was *total chaos.* As a business we were buying in theses devices and *acting like a family*, buying one 'app' and giving it to 5 machines and *Apple* certainly *didn't think it through,* with mobile devices and make them ready for businesses.'

A closer examination of the language used to articulate opinions by IT specialists, however, reveals that any deflection from original design purpose is often expressed as deviant (*should* and *ought* prefixes actions), implying that there is an objective, correct and efficient way to apply technology (inherent in the design), involving the employment of facilities to their full extent rather, than informed free choice. One IT trainer notes, for example, that while technology has the '*capability*' to provide a variety of educational *tools*, he thinks '*that the teacher's aren't using it in the right way to teach the students'*. A view confirmed by another IT specialist, Charles[b]:

'So if you imagine my *academy* which has 120 classrooms of which 119 have *interactive whiteboards*, of which *less than 10* where being used *properly*. And teachers are struggling because there are a lot of iPads out there, mobile technology but iPads in particular which *aren't being used properly*. I would suggest that most iPads are only being used for 5-10% of their *capability*. To be honest I would suggest that the use of IT in the staff is the same as it always has been. It hasn't changed. They are using it every day but are they doing if *effectively*?'

The opportunity to exemplify *adaptive and free use* of technology was embraced enthusiastically by non-IT specialists, since it was novel and hitherto often unvoiced. However, 'correct' engagement with technology had become sufficiently internalised with some managers, as to be expressed in terms of guilt. Micha[d], who is expected to use technology in the classroom actually experiences greater freedom when it fails, explaining:

> 'Whereas I *always use* SMART boards and I *sometime use them interactively*, sometimes I find that in the lessons when my SMART boards are just *broken* and I have to teach whatever is there in my head, they're actually reflective of much *nicer and more genuine teaching*.'

While Hilary[c], who prefers to use selective elements of a white board and older technology expresses internal anxiety about missed potential:

> 'I was *able to get around just fine and just use a white board and a projector* when I needed it but there was always a *thought in the back of my mind* that *maybe* I could *do more* with a SMART board and now trying to use one I feel like *I don't know how to use one as effectively*. Actually having the *older technology* just the *projector with an image of the music* and a black board pen was fine and I was able to teach the way *I wanted to teach*.'

Yet the continuity and normalcy inherent in well-judged, adaptive processes and their contribution to effective, individualised teaching programs is comprehensively explained by Nick[a]:

> 'Teachers have always been *experts and adapters of resources* and *technology*. In the early days people were adapting things so they could use them in the *classroom*. Now when I'm working with schools again people have gone in and *adapted technology*. So they've taken iPads which were essentially a personal consumer device and they've adapted them and they've used them in a *whole variety of different ways*. And for me that will *always work* and anyway *what someone designed for one teacher won't be right for anther teacher*. Witness the fact that we used to *photocopy all the text books didn't* we? And create our own worksheets. Paste and stick and goodness knows what else because that wasn't *quite right for our class* and I think teachers will always be like that. They will *always borrow and adapt* and sometimes it's on a *grand scale with technology* or sometimes it's just a *resource that someone* else has published on line and they think, well I'll *have 50% of* that and I'll reject the rest because I think I can do that better.'

Alienation and de-professionalisation. Limited UK-based research has focused on the relationship between educational technology and alienation amongst teachers, since for many commentators this was considered to be a temporary aspect of an aging workforce, which would disappear once the new generation of digitally native teachers was in situ. However, the intensification of problems with the recruitment and retention of young teachers, despite government published figures to the contrary, warrants investigation.

A minority of academics in the field of educational reform, however, have long emphasised a direct link between technological developments, de-professionalism and alienation, based on issues of fragmentation of work, deskilling, standardisation, and loss of autonomous control; themes emanating

from Braverman's (1974) neo-Marxist analysis of deskilling 20th Centuryfactory workers.   Sociologists, Apple and Jungck (1990) suggested (from a critical theory perspective) that the rationalising role of the computer, with its capacity to separate the conceptual elements of the job from its execution, degraded teacher's labour of its complexity, fostering what educational psychologist Sarason (1990: 123) references as the atomised 'assembly line' in education and what Cuban (1993) identified as the rejected student-machine relationship which in cultural terms explained technology's 'failure'.   Although referencing American educational systems which are arguably more prescriptive and more standardised than their British counterparts, recent developments in the UK have rendered them increasingly valid (Selwyn 2011a).   Issues criticised by academics focusing on university teaching, such as erosion of academic freedom (Petrina 2005) and the creation of 'digital diploma' mills (Noble 2001) are equally pertinent to developments in senior schools, particularly in the context of contemporary digital learning environments and shared resources.

In the UK expectations currently exists for teachers to create (ignoring intellectual property rights) and share standardised digital resources, (both economically beneficial to the organisation) and to employ Virtual Learning Environments with their effectively employ pre-packaged curriculum content, (widely employed in teacher absence).   While Monahan (2005) has criticised the creation of hugely time consuming online resources as degrading expert work through the lack of recognition and deskilling both teachers and their students by fostering a tool mentality, producing 'mechanical tasks and situations of social disconnect' (2005: 290) they elicited no concern from the managers interviewed for whom they were generally seen positively and creatively.   Moreover, while one head teacher voiced concern over academies' increasing '*employment of non qualified teaching staff*', Hodas' (1996) notion of the teacher's morale being undermined through fears of being replaced by a machine or perceptions of human labour denigration (Mumford 1964) based on the conceptualisation of educational process in terms of digital input and output equation, with the teacher as just one lowly element, is too simplistic.   While Emily$_c$ might speculate over future employment, her joking style emphasises the real sense of professional security:

> 'I'm a little bit scared that I might not *have a job in ten years* (laughs).   Or we'll just be the *markers and mark everything*.   I think that will be our role.'

On the contrary, most managers interviewed perceived teaching as art rather than a science and education as a fundamentally human process (Dreyfus 2001; Volungevicience & Leduc, 2006) which valued the corporeal presence, personality and guidance of the teacher as emphasised by several academics (McWilliam 2009; Taylor 1998; Schwartz & Bransford 1998). Some managers cited reports highlighting the link between technology use and poor academic performance, suggesting a turning point away from previous consensus in public discourse. Developing Crook's (2008: 33) criticism of the discourse which equates teaching dismissively with 'delivery' and fails to recognise human beings capacity for un-situated learning, ('being told things outside of the times and places and the situations where those things are experienced'), $Emily_c$ stresses the human relation aspect of teaching children:

> 'Well I think probably students *can't interact with technology quite in the same way they can with a person.* So I think discussion isn't quite there with technology. I don't think they could learn a *course completely from an online* course. I don't know that they *would adhere* to it as well as they would if they had an *individual to see.* What I'm imagining is these online courses which are great for adults, fantastic, free. If *something similar were available for students I don't think they would be motivated to stick with it* whereas a teacher *discussing things with them* a lot, giving them *encouragement, telling them where they are going wrong,* giving them *targets, inspiring* them.'

Where this research did elicit a consensus of concern amongst middle managers was firstly, in issues concerning the pace of change which is seen as relentless, to the extent that for $Emily_c$ the future has become 'scary':

> So *everything has changed* and I would say *the pace of change is increasing* again this last year and we, in the next 5 years, we expect big changes. At the moment I feel a little *bewildered b*ecause I don't know where things are going and maybe I feel o*verwhelmed* as well because I don't know *if I can change everything I do* to fit in with all the new options available.'

A fear explained by $Graham_b$ based on its imbalance and source; with constant government initiated change damaging the profession by eroding trust and overwhelming human capacity to absorb, reflect or appraise new systems:

> 'But we do *need continuity.* We don't want things to change all the time. It's the drip effect we need. It's got to operate *over a period of time* so that it builds up *knowledge and understanding.* If you *just zap* teachers every year with; 'we've got a brand new education system now, we've got a brand new examination system', that's when we get problems and that's when teaching and learning is going to be affected.'

Secondly, through alienation based on the loss of a sense of whole perspective and feelings of autonomy, particularly the subsumption of overall departmental strategy and vision and the replacement of a once ostensibly '*collegiate relationship with senior management*' (whereby departmental heads were credited with expert, independent status) by feelings of '*subordination*'. Several managers clearly motivated by 'standards of caring, passion for their work, and professional commitments' (Fenwick & Edwards 2010:127) while observing that their younger staff were increasingly '*demotivated*' by an effective removal of autonomy in the classroom (via micro-management and behaviour and performance control), felt disempowered by their inability to intervene. Trends initially observed by Apple (1991, 1993) have become accentuated with teaching; its content, time, place and pace of delivery and assessment (utilising target setting) being (via the applying of digitalisation concepts to non technical human practices), 'transformed' into processes which are expressed in quantifiable formats for ease of monitoring via '*counting*' and leading to over control and planning by external authorities. Where this process was extended to managers, it was perceived as seriously '*demeaning*' to their concept of the professional judgement and expertise.

Analysis

In summary, technology has not dramatically altered the teaching element of the manger's job. Educational processes reflect a continuity which has been aided at both the levels of pedagogy and administration. Human adaptation and social shaping of, and creativity with, technology is pronounced (although unvoiced) and deployment is pragmatic. Highly positive, non-age stereotyped attitudes towards digital technology are normalised and highly valued when employed within an autonomous environment. Unforeseen consequences of technology, however, pertain to increased teaching workload due to greater communications access from students and parents.

Change is, however, pronounced in the non-teaching dimensions of labour which have both developed disproportionally and detrimentally. Low status, low-valued administrative tasks have increased exponentially, while managerial responsibilities have been distorted to prioritise divisive monitoring functions; both trends related to the quantifiable facilities enabled by technology, engendering perceptions of constraint, disempower and de-professionalism, which is further explored in the following chapter on meso level analysis.

Chapter 5

Educational Technology at the meso level of analysis

Introduction

This chapter, based on the premise that educational technology does not enter a vacuum, discusses the empirical findings related to the immediate social context for the analysis of educational technology and middle mangers, namely the school in its organisation sense (pertaining to Layder's *setting* domain) as interpreted in terms of its constitution, nature and purpose, in order to better understand the processes shaping the tripartite relationship between them. It addresses the research questions as to whether, and in what manner technology has changed the school organisation and the implications for middle managers' labour. The empirical data analysed in this section is drawn primarily from interviews with middle managers (pastoral and academic), some senior managers and key informant experts (**Appendix 2**). The empirical findings are discussed within the context of key issues identified from the literature and emergent from the interviews, relating to themes of *continuity and change*, *agency and structural constraint,* discussed firstly, with respect to the physical, and secondly, the social dimensions of the organisation.

Theories and omissions

Within much educational technology studies literature, organisational analysis and contextualisation is significant by its omission. When this gap in the literature is addressed, it is often by international, empirically grounded studies dating from the 1990s, employing organisational and management studies theory tangentially and somewhat 'uncritically' (Imants 2012; Hoy & Miskel 2008). This applied research continues to be predominantly *learning orientated* with any teacher-based focus restricted to rationalization of work issues; reflecting its instrumental purpose in evaluating and explaining technology-based initiatives by reference to various 'inhibitory' factors (e.g. unsound innovation, teacher resistance, inadequate resources), as developed in Chapter 6.

The limited body of literature directly relevant to this research, discusses organisational analysis and educational technological issues within a more organic perspective which can be distinguished on two grounds. Firstly, between

theoretical works, grounded in *historical methodology*, which postulate the school as an enduring, conservative, organisation, for which explanations of proclivity towards continuity over change are explained in the agency of elites (as initiated by Tyack & Tobin's *grammar of schooling* concept).   A theme later reinterpreted in educational technology literature to support assumptions referencing the incompatibility of new technologies with the 'Henry Ford' or industrial-era school organisational model (Wilhelm 2004; Carolan et al. 2003) and further developed in conceptualisations which focus on the role of the physical *materialities* of schooling (Lawn & Grosvenor 2005).

Secondly, conceptualisations within the discipline of *social science* which explain continuity in more socially deterministic terms (Hodas1993; Olssen & Peters 2005); theorising the extent to which the contemporary organisation, assimilates educational technology into pre-existing processes and functions, with some researchers (Ball 2003; Selwyn 2011b) emphasising the significant role played by conflict between organisational culture (categorised as organisational and disciplinary) and subcultures (academic subject) in a manner which significantly constrains the agency of the individual teacher in their relationship with technology. This research, whilst evidencing some elements of continuity in the physical materiality and processes of schools, confirmed that middle managers perceived (from a long term career perspective) organisational structure, attributed to technological integration, to be both transformative and constraining, as initially hypothesised.

School organisation: 'materialities' & physical presence of technology

The school in its capacity as workplace for its teachers (contrary to its traditional learning environment perception) is structured through resources and relationships which can render the job easier or harder (Hargreaves 1994). The significance of the former's role as composing the practically '*invisible*' physical artefacts that constitute the sites of the school (classroom layout, buildings, offices, desks, books, vestimentary codes etc.); the *materialities* of schooling, was first emphasised in a collection of history of education and history of technology studies, edited by Lawn & Grosvenor (2005). The application of historical methodology (utilising the past to inform present practice) provides a contrasting insight in this research to the predominant technological deterministic discourse

of traditional educational technology studies. Assumptions about *materialities,* for example, are not credited with any fixed dichotomy between people, routines and collections of 'inanimate objects'; uniqueness, rather than generalizability and model formulation being the historical operative, with an explicit aim of encouraging critical enquiry of the way in which objects are given meaning, how they are used (and adapted) and linked in heterogeneous networks. Although, based primarily on pre-digital technology the conceptualisation aids understanding of how new technology is incorporated into existing physical structures and how physicality influences the work of individual teachers.

Prompted specifically by public expenditure into digital educational infrastructure, more recent study within the multidisciplinary field of 'learning spaces' has also sought to define the relationship between the physical environment and pedagogical change.   In its 'realist' or deterministic dimension, space (perceived with an essence), is argued to critically influence learning and teaching patterns; acting as an agent of behavioural change.   However, normative assumptions suggesting that *modernise*d, open plan architectural school design induces 'collaborative,' 21st century style 'dynamic' working practices, as opposed to bounded or contained old fashioned industrial revolution models, (Li et al. 2005; Newton & Gan 2012; Woolner et al. 2014) are not verified by recent empirical research.   Mulcahy et al. 's (2015) study into four Australian schools (implementing the Building the Education Revolution infrastructure programme from 2009) for example, discovered no causal link between learning spaces and pedagogical change. Thus confirming earlier criticism (Boddington & Boys 2011) of both an under-theorising of the concept and a call for more empirical educational based research, embedded in a more 'relational', complex and multi-form understanding of the relationship.

Implications for this research lead to a questioning of the extent to which materialities influenced (positively, neutrally or negatively), constrained or facilitated the way in which digital technologies were utilised by teachers and whether issues of technology continued to be perceived problematically in 2016 (as articulated in survey-based empirical studies throughout the 2000s). In contrast to deterministic assumptions, some empirical evidence suggests that human agency readily overcomes technical problems, as exemplified by the transference of computer technology from restricted access in computer

laboratories to classrooms, attributable to teacher persistent as cited by Hodas (1993).

The timing of *materialties's* publication, however, in the midst of a continuing debate over the perceived ineffectiveness of ICT-driven reform, has seen its original meaning transformed. A body of literature (Perelman 1992; Dean 2002; Jenkins 2005; Tooley 2006) has adapted the concept to support an argument that attributes technology's perceived transformative *failure* to a mismatch between new technologies and the antiquated nature of the state public school structure as interpreted in the retention of nineteenth century factory style architecture and mass education function. Whilst some scholars such as Cohen (1987) previously cited the unchanging nature of school structure, over a seven hundred year period, and action-orientated researchers such as Apple (2006) foresaw opportunities for redesign and reconfiguration, an interpretation (Miller 2006, Warner 2006; Kelly et al. 2008) explicitly critical of, and avowedly anti-contemporary schooling in intention (updating the anarchic de-schooling debates epitomised by Illich's *Deschooling Society,* 1971; Toffler 1981 and Papert 1980, 1984), argue from a neo-liberal rationale for the total incompatibility between technology and the school as an institution, thus explaining its perceived continuity.

Some interviewees, reflecting on their careers from positions of senior management, whilst citing physical changes (evidenced by digital equipment) in classrooms, did on balance perceive an overall continuity in practice. Nick$_a$, a vice-principle whilst acknowledging the 'quickening pace' and 'enormous change' over the last 18 years in his teachers' and students' use of technology noted the continuity in basic processes:

> 'I think there is still significant elements of continuity. You've still got the fact that teacher's *set challenges* to students to produce a bit of work. I think technology has given students access to a whole host of different ways of presenting information back…, although there's still that *dynamic* happening, that sort of *work cycle* from a member of staff. *Staff sets a bit of work student responds to it. Member of staff marks it.'*

The theme of continuity was observed by most middle managers over fifty years of age, reflecting their positionality in drawing comparisons, including an assessment of traditional teaching styles with some noting that the employment of devices such as the whiteboard had not really changed pedagogical practices.

However, the equation of *didactic* and *traditional* methods of classroom management often belies a misunderstanding of the complexity of what is often labelled as 'didactic' teaching, in a pejorative discourse from superficial classroom observation. As one experienced head of mathematics, Michael[b], emphasises, in evaluating his personal teaching style which he has never perceived in didactic terms:

> 'I certainly *don't consider* myself as being a *dispenser of information*. I will be perceiving myself as someone who *is posing challenges*, posing *questions* to a group that I'm working with, always coming from the starting point of: Tell me what you know about this? Give me something? Could you imagine what might happen if I do that? Could we think about that? So kind *of throwing it back to them* to get a response that will take us forward to something else, *rather than me almost lecturing, …*It really is a *leading out of education*, it's a drawing out from them of things that they actually know but don't know that they know and in that *process*, enabling some *new element in mathematics to emerge.*'

This empirical data countered similar assumptions that physical equipment dictates teaching style or that teachers are not using a multiplicity of styles and interactive approaches within a single lesson. As Nick[a], (training teachers) highlighted, when encouraging the adoption of traditional, teaching styles with new equipment such as 'Smart boards', *because* they were considered to be naturally *interactive:*

> 'I worked with some teachers recently who were *of my generation*, some in their fifties. I said what I want you to do is remember the way that you used to use your *whiteboard or chalkboard, back in the 80s* and I want you to use your *interactive whiteboard* like that, I don't want you to use it to show *PowerPoint presentations*. I actually want you to use *those old skills*, building a lesson as it goes and responding to pupils and actually being far more interactive with the lesson content than *just presenting received knowledge in another format.*'

Some continuity was explained by lack of choice; by virtue of the constraints that organisational physicality can impose on the use of technology, as previously acknowledge by several scholars. Selwyn's (2011b) empirically-based observation of the problems inherent in incorporating modern technology into the Victorian style architecture that constitutes so many British schools, is but one of many illustrations. As Jack[c] explained with respect to the restraint of classroom design:

> 'Yes, I think that one of the *difficulties* is that whilst *technology* has moved on so *rapidly within a classroom*, the *classrooms are inflexible*, some …money was available so maybe that gave us some room for

designing rooms differently, but they're *very old school* in terms of the way in which they are set up. So you might have a *science lab* and you *can't change anything much* in classrooms, whilst *technology could liberate* you even more, but with standard classroom that can be a little frustrating.'

ICT co-ordinators in this research, all emphasised the potential problems created by inadequate infrastructure, leading to the '*ineffective*' use of technology by staff. Although the redundancy of cabling, improvement in servers, and the use of mobile technologies via Wi-Fi had solved some integration problems in contemporary buildings, the capacity of new technologies to outstrip 'power' capacity was a recurring challenge. Ian[c,] an ICT middle manager stresses the importance of beta testing infrastructure before it fails:

'If you don't test it, it ain't going to work. Particularly with the tablets. You've got to have really robust Wi-Fi networks. You've literary got to go to every single classroom with 30 tablets turn them on, get them onto Youtube or your video. You can't do it, don't do it. That's what we're saying to schools. Test your Wi-Fi and your broadband.'

Moreover, several *teaching* ICT co-ordinators, noted sympathetically and pragmatically the reluctance of staff to engage with technology once continued poor experiences had eroded confidence as Steve[a] observed:

'The main thing is if [teachers] haven't got confidence. It doesn't have to *go wrong that many times* before they say I just can't do it. I just won't use this. You're stuck there with technicians turning round and saying well it's just a cable that's come out. And you say well I've got a class of 25, I'm *not crawling under the table*, you know. So you *do see it from the other side quite easil*y. It's so easy *to detach yourself when* you're just dealing with IT. You know, it's only a projector, two cables, five minutes and its fixed. And you just don't see that the teacher is just standing there. They've prepared something, they've got 25 students there and then after 10 minutes you've lost them and it's the end of the lesson.'

This study found that a diverse range of physical materialities; classroom logistics, timetable and syllabus pressure, including the highly bounded nature of lesson times, were perceived as restricting factors in the use of technology by several interviewees, throughout their career. Carl[e,] as head of history recalls there is a difference between the theory of IT implementation and its practice. Poor wiring and connectivity in old buildings, pupils breaking or utilising 'unreliable laptop systems, research resource access which demands more time to use effectively than a 45 minute lesson offers' were all cited as constraining factors:

'The problem was you came away [from a course] *enthused* by all the ideas and …it was then *trying to implement* it in a classroom. I mean with the lap top initiative you'd got the problem of pupils being able to log on, in the time, you'd got the problems of pupils turning up to lessons without the laptops, so although you could argue great idea, the actual *practicalitie*s of it made it a lot harder than perhaps had been envisaged.'

A similar, current experience is articulated by Emily$_c$, in an independent girls' school, reluctantly recalling how the demands of an ever increasing syllabus and time shortages restrict the use of equipment such as *iPads*, because while generating group discussion ('*they won't stop*') and research activity ('*glued*' to perusing websites) they actually subvert the necessary pace of her lesson:

'*I can't maintain the pace* of my lesson. It can *derail* what I planned. If I've got 5 activities I don't get to the end and I'm constantly having to say close your iPad now we have to move on and they don't want to. I feel that they do want to research things and I cannot allow it because they're so slow. So for homework absolutely, but otherwise its just too slow. I can't have curriculum time really given to many projects.'

A counter argument to the rigidity of school *materialities*, however, is suggested by numerous empirical studies (e.g. Barker & Gardener 2007; BESA 2009) which purport the case for a substantial change in the physical, as evidenced by the extensive use of digital artefacts (computers, networks, etc.) in contemporary UK schools. A majority of the literature backed by reams of official government statistics, suggests that government funding (£320 million on digital hardware and £51 million on software in 2009, cited in Selwyn 2011b) has facilitated a substantial increase in the physical presence of technology in all secondary schools since the 1990s. General observation of UK secondary school classrooms, confirmed by all interviewees, suggests that schools have certainly changed physically.

Whilst much literature minimises the ensuing effects, arguing for minimal impact on underlying educational processes, all interviewees reiterated the significance for their working lives of physical changes. For some senior middle managers this represented an incremental development from a status of 'no equipment or training at all' in the 1980s to 'limited' in the early 1990s, with a few 'scattered' *Archimedes* and *BBCs* in the early 1990s, with some interviewees opining the accessibility of Acorn's 'graphical interface as a 'major change'.

However, the assumption of early, widely accessible and functioning educational technology is often over-estimated in the literature. This research

confirms Hawkridge's (1990) overview of computer equipment and software in the 1990s as being highly restrictive ('very, very specialist') which, as interviewees articulated, explains its restricted application in the classroom. Robert$_b$, a head of humanities recalls, 'a single BBC computer with a big laser disc player (for running the BBC *Doomsday Project*) being located in the library,' while the IT department had priority over access to the one or two early 'computer rooms.' A policy, as Carl$_e$ (an ICT '*self-taught*' head of history) observed which was accentuated when 'IT came in at AS and A level', continuing:

> 'The *problem* was if there weren't computers in your own department you really had a problem being *able to use it,* so it made it very difficult to plan anything on a *regular basis*.'

Limited qualitative research has, however, focused on the serious implications for teachers, of restricted access to fixed resources, often in prescribed labs, lack of training and of the unreliability of infrastructure systems (time and discipline implications) in contrast to media led misconceptions of the universality and portability of technological devices for student use in schools. Assumptions previously criticised in Watson's (2001) qualitative-based study in UK schools, which concluded that until students had portable, individual devices for use in every classroom, any transformation of education, however idealistically envisioned, was unrealistic. A view which Robert$_b$, a head of humanities mirrors in his frustration at being unable to experiment effectively in the early developmental stage of educational computing through constraints which limited him to the sole production of basic word-processed materials for students.

> 'So I was looking for *opportunities* to use technology where I could, but the big thing in the way was that you could *never* get *access* to the devices or *software* was not appropriate. The use of ICT across the school was *very limited* and that *device* was used mostly by myself..., producing resources and materials for pupils, then *photocopied*. We also had students who would write up their work using the *one* computer and normally myself or my second in department would pack the computer in our cars at the end of the school term and take them home and produce stuff at *home*.'

Although empirical studies continue to cite these constraints, they are often granted secondary status and perceived as excuses rather than genuine causes of non-use (Cox et al. 1999; Passey & Samways 1997; Trucano, 2005). Issues of inadequate and un-sustained professional training and equipment are equally underestimated, often evidenced amongst a list of constraining factors,

formulated via teacher questionnaires and surveys to justify poor up take of equipment, lacking depth of explanation of an understanding of the significant consequence of repeated negative experiences on future engagement, particularly when compulsory and state provided (as via the National Opportunities Fund). Since the literature's assessment of the underuse of hardware has often been inconclusive the dominant discourse has consequently transferred the focus from a utilitarian-based explanation to a more ideological interpretation in which schools and teachers are perceived to reflect features predominantly of continuity rather than the change.

The long term perspective of this qualitative research, however, has enabled interviewees to identify key turning points in the development of educational technology which they consider to have produced lasting change in their professional lives. Several observed an embryonic, 'slow innovative period' in the mid 1980s, followed by an 'ad hoc' phase in the late 1980s and early 1990s, which (while limited with respect to equipment access, lack of training or integrated governmental 'directional' policy) was perceived as a period of individual drive, experienced fondly ('the good old days') in terms of 'creative initiative', freedom to experiment and 'take risks', ending around 1993/4 with general ICT access as Andrew$_a$, a deputy head recalled:

> 'We were starting to get to the point where there would be a computer available in the *staff base* or booked for staff to use, as well as perhaps *one, two or three* out in the *classrooms.* I think the school got its first *suite* of *PCs in 1995.*'

However, 1997 onwards was recognised as a major watershed in working conditions by most interviewees; spearheaded by a multi- faceted approach composed for the first time of a national strategic governmental policy ('there was a policy and the policy was technology is a good thing'), infrastructure ('*the world wide web, the internet*') hardware, the introduction of the widespread use of technology for administration as well as teaching and teacher training provision (New Opportunities Fund). Moreover, a clear top down initiative was initially perceived to integrate with a clear bottom up enthusiasm from heads of department, as summarised in language which emphasises its revolutionary ('*astronomic*') effect by Dominic$_a$, a deputy head:

> 'We have 'Education, Education, Education' and the Labour government in 1997 increasing education spending. There was an *explosion* in the use of *ICT for administration and management* at those times; that all embracing management-information systems. I was part of the *national*

trial for 'Lesson Monitor' which was lesson by lesson registration from SIMS [Schools Information Management System] in the year 2000 and that was a national project, national resourcing £25,000 per school I think, the New Opportunities Fund, ICT training, funded by the Millennium lottery, about 2000, so there was a *belief* in technology and pump-priming activity in virtually every area. You got support for *laptops* for teachers, *curriculum online* because we'd had the *Internet connectivity boom* which was again about '96, '97. So all that *perfect storm* of technology being available and devices being available, money being available, plus *enthusiasm,* all at the same time I think made a difference.'

This research suggests that the significance of rapid physical change over thirty years for long serving middle-mangers has been underestimated in the literature. As Nick[a] illustrates when comparing the process of change experienced over his lifetime to be as dramatic as that of historical industrialisation:

'When I left secondary school in '82 there was one computer in the school and only people in *white coats* were allowed to use it, doing further maths and it was *shut away* in a room… I got back into school in 1987 and started teaching and there was the occasional 'BBC B' device. Those teachers who began teaching mid 90s, they hardly themselves used a computer when they'd been in school. By the time you get to the end of the 90s, you've got a very different situation. You've got an *explosion* of devices into schools in terms of multiple rooms in schools in terms of computers. I became a deputy head in 1988, went into a school with I think *90* computers including administrative devices in 1988 and by 2001 there were *330 devices* and every teacher had a *laptop.* Every classroom was *networked,* there were *study areas* with computers in for sixth formers to use, multiple IT teaching. '

The development of email as '*the biggest single factor*', '*government broadband*' and '*desktop mobility (via laptops), combined with National Curriculum imposition and a new policy cross-curricular IT by government*' were considered major developments from the late 1990s to the early 2000s by several heads of IT. As Chris[b] explained, because compulsory and accessible usage were combined for the first time:

'Here's email. If *everybody's got an email* now you are all going to use it. And the heads were saying we're going to use it...and I think that was a big driver …everybody *came online then and started using technology* and of course technology got better then with the *laptop developments.* It was …*desktop mobility* and it became easier for teachers to start using it.'

Because classroom teaching is central to the definition of what the professional does, the preparational work involved in organising it (preparing, marking, meeting attendance) is often ignored; perceived as invisible, together with the other activities that compose teaching beyond the classroom. For most

middle mangers interviewed, however, the additional, administrative and managerial aspects of the job have become increasingly complex and onerous, encompassing collaborative planning, peer coaching and mentoring NQTs, staff development, review committee participation, parental consultations, staff meetings, and (due to escalating litigation threats and accountability) the accompanying proliferation of paperwork (permission, explanation, analysis) management.

Equally, for all interviewees, technology has become an embedded feature of how these processes are conducted; indispensible ('*I'd be lost without it*', referencing *Excel* for budgeting purposes), utilitarian ('*management information system where we can track things like attendance and we can monitor progress with databases there with student information for tracking*') if not mandatory (e.g. student registration, report writing, internal communication and presentational board work). All such tasks necessitated at least the employment of one staff desktop computer in the classroom, with the majority of interviewees having personal mobile laptops or tablets. Whilst a few staff recognised a need for self-protected personal time and space, the majority were connected to the school intranet throughout the day with the erasure of traditional public-private work delineations. While acknowledging drawbacks, Jack$_c$ illustrates how such fulltime connectivity via smart phones has become an accepted cultural norm, especially with respect to supporting students; procedures which would have been deemed unacceptable by unions and management in the 1980s:

> '[students] have access to our internet website *24 hours a day* and often we get emails during the *night*, and I think that is quite a *useful* thing. I can access my *emails* by my *phone* from students pretty much *simultaneously*. A simple thing is the build up to the exam where a student might ask a question and I can respond via phone pretty much immediately that helps a lot. In a sense on a *personal level* I have my email set up so I get emails when *I'm at home in the evening* and I tend to response to that and at lunchtime when things come in *I feel I should respond*.'

This empirical data reveals, however, that assumptions (based on government statistics) concerning the equitable distribution of standardisation, functional equipment across all sectors in UK schools by 2016, post Blair innovations of the 1990s, is false. Although most interviewers compared, favourably, current status with historic situations at the start of their careers and several noted better provision in private as opposed to state school, variability was the norm. As Emily$_c$, in a well-equipped girls' urban independent school

evidenced (2016) the improvement achieved by 2002 was not considered overly dramatic:

> 'When I came to this school 13 years ago we *had hardly any computers* for *staff use*. We had 6 computers in the staff room that was it. We didn't have computers in any classrooms at all and so we hardly used technology at all and students *didn't have access to computers at all.*'

Although Martin and Norman's (1970) studies in the 1970s have drawn attention to constraining practice factors as an explanation of some teacher's antipathy towards technology (serious lack of access, poor technical support, unreliability of hardware and insufficient software), the re-establishment of financial issues as a key factor in contemporary educational technology provision (despite static or falling IT costs) was suggested by several interviewees. A trend identified earlier by Watson (2001), when highlighting problems created by computer room layouts based on financial and technical concerns rather than educational purpose. Reduced government expenditure for example was cited from respondents in sixth form colleges as a significant challenge, in contrast to some 'richer' independent schools which were sufficiently well-funded to pilot schemes for utilising flexible wireless connected laptops (and *iPads*) with their younger (National Curriculum 7, 8, 9) students. While some flagship academies were noted to have '*state of the art hardware*', others, as Ethan$_c$ explained, were restricted to '*one computer and whiteboard projector*' in his classroom, with computer suite access limited by prioritisation to computer studies and technology classes.

School organisation: social and cultural

Since this thesis critiques omissions based on a deterministic and de-contextualised concept of technology, it now focuses on an understanding of the cultural and organisational context into which technology is implemented, noting that a dearth of theoretical and empirical research on school culture in the 2000s has compelled most commentary to reference earlier studies conducted in the 1970s, 1980s, 1990s (e.g. Lortie 1975; Hargreaves 1994) which attributed cultural factors a primary status in school working patterns and behavioural explanations. The former reasoning, perhaps dubiously, that past social behaviour descriptions shed light on current practices.

Definition of organisation culture. Although there is a consensus on a generic definition of culture; as systems of ordinary, taken-for-granted meanings,

values and symbols, deliberately shared amongst members of a social group (Erickson, 1987), the interpretation of what constitutes school functions, processes, practices and goals, and the degree of influence they have is more contested. A useful interpretation of the 'social component of the school organisation references the strict social structure of the school and the interplay of the multitude of social relationships within its highly formalised power systems (Selwyn 201b). Some sociologists, moreover, emphasise the durability aspect of social relations (exemplified in the repetitive patterns of daily activity and social encounters) to explain the enduring and rigid social structure attributed to schools. Within the field of SST, on the other hand, the relationship between new technologies and school organisational culture, is perceived in more mutually shaping terms.

Technology and flattening hierarchical structures. A discourse envisaged by many educational technologists proposed that ICT would significantly affect the structure, communication and management of organisations including schools. Computer based information and decision support systems were particularly expected to *flatten* out the organisational pyramid (Zuboff 1988) leading to fewer management levels and greater work-related flexibility (Shuttleworth 2003). These post-heirarchical, highly iterative relationships (Lovejoy 2004) directly attributable to digital technology were to lead to new de-structured and democratised schools (Collins & Halveson 2009; Lee & Gaffney 2008) On the one hand these assumptions can be critiqued for their interpretation of technology as neutral, value free or indeed idealistically beneficent. On the other, for their lack of basis in empirical evidence. The supposition that hierarchical structures are antiquated, however, is rooted in comparative observation rather than substantiated explanation. One that presents *modern* contemporary organisations in an idealised format (how they *should be* rather than their *actuality*), characterised by features such as flatter organisational structures, dissemination of information, innovation values, creativity and risk-taking in decisions and actions. For even if the initial premise of the transferability of organisational structures from the private sector to public organisations, such as schools is not flawed, early organizational studies literature indicate that the influence of ICT on organisational structure is highly contested. Whilst some formative studies, for example, indicated evidence of a reduction in hierarchical levels in certain industries at an operational level (e.g. railroad

management, Dawson and McLaughlin, 1986; manufacturing, Pfeffer et al., 1977), at an executive level increased centralisation is also evidenced (e.g. newspaper organisations, Carter and Nancy, 1984; railway management, Dawson and McLaughlin, 1986). As Hodas (1993) warned there is a characteristic assumption amongst technologists and the rational model school in general that organisational cultures are infinitely malleable and accommodating to change.

School organisation: social, hierarchy and continuity. However, the literature analysing the school as an organisation in comparison with other contemporary institutions, generally agrees on its hierarchical and bureaucratic structure (Handy & Aitken 1990; Selwyn 2011b; Hodas 1996), defining organisational structure as the 'arrangement of workflow, communication and authority relationships' (Niewenhuzen & Rossouw, 2008). Selwyn (2011b) evidences numerous examples in contemporary schools of clear internalised divisions with respect to time (semesters, school days, lesson times, breaks, holidays), space (classrooms, laboratories, offices), student classification (age, ability), knowledge (segmentation by subject) and labour control, all encompassed by highly visible and coherent lines of authority and power. Heads of departments, as the central focus of my research, in this organisational reading, constitute one middle level element of a hierarchically organised labour force, ranging incrementally through status and authority, from Newly Qualified Teachers and teachers at the base, to senior management and head teachers (or consortia in academies) at the pinnacle; subject to an overriding local authority and/or central government control.

This research discovered no perceived evidence of the flattening of hierarchical structures or the widening/broadening of traditional decision-making processes. Although the personality and leadership style/qualities of the head teacher and their (lack of) interest/proclivity for in educational technology was referenced with respect to its effective implementation, the majority of interviewees viewed the organisation as unchangeably *hierarchical,* with no expectation that it had, or would ever be otherwise. As Henry$_c$ summarised:

> 'I think it [structure] has remained *generally hierarchical…* with *decisions* made at *the top* of the system. We have *not* had an awful lot in terms of *democracy…* there is *some independence* in some departments. But generally speaking I think it is an hierarchical structure, as it has always been.'

'Grammar of schooling' and continuity

A theory widely used to support sociological explanations of the continuity of organisations (social relations and structures) originated in historical methodology. The concept, *grammar of schooling* first employed twenty years ago by historians of education; Tyack and Tobin (1994), has retained an enduring primacy, arguably because it focused debate on the significance of the school organisational structure to inhibit change for over well over a century. Whilst permeating numerous subsequent studies, each with varying epistemological and ontological orientations, however, its original meaning has been transformed. With an explicit purpose to offer insight into the resilience of the urban-based American public school system to contemporary reform, (based on case study archival analysis between1870s-1960s) the thesis (developed with fellow historian Cuban; *Tinkering Towards Utopia; A Century of public school Reform,* Tyack & Cuban, 1995) suggested that the long continuity in the basic structure of the modern industrial era school was supported by combined mechanisms for organising practices (shape of classrooms, divisions of time and space, splintering of knowledge into subjects, classification of students, allocation of classrooms and grades) so normalised and stable as to appear invisible; equitable to the manner in which grammar organises meaning in language (Tyack & Tobin 1994: 454).

Their analysis, critical of ahistorical explanations, does not argue the impossibility of reform, but on the contrary suggests achievability via a combination of individual agency and propitious timing. However, significantly under-acknowledged is the explanation of continuity from a political perspective; the agency for change being represented by political savvy powerful *elites*, *external* to the organisation itself (state officials, university professors, scientific management proponents). Several interviewees in this research perceived that political direction and economic constraints were crucially significance factors in implementation and (non)use of technology; issues further developed in Chapter 6, which focuses on macro level analysis.

However, Tyack and Tobin's conceptualisation has become a victim of its own metaphor to some extent as subsequent readings have interpreted it in a more rigid, unalterable, homogeneous understanding, as distinguished by the development of two clear themes within the literature; organisational resistance to educational technology and organisational assimilation (as discussed below).

Robinson and Meir's (2006) employment of a quantitative-based path dependency model (identifying past decision limitations imposed upon the present) to explore the rigidity of institutional decision making in their empirical investigation into the Texan public school district 'social promotion' policy is of this format. However, comparisons with the 'grammar of schooling concept' is broadly applied and the difficulties in acquiring data sets (and convincing variables) from an organisation over a time frame (4 years in this case) rendered the correlations 'qualified'. Both interpretations pre-suppose the school as an antiquated, monolithic, hierarchical and bureaucratic structure, with clear patterns of authority and regulatory systems (Hodas 1996) which explains both institutional inertia and by implication an impeding of technological change. However, theories (e.g. Fullan 1982, 1991) which credit primacy in the agency role of teachers as paramount (often implied in recommended strategies for avoiding top down initiatives) is arguably overly simplistic.

Interviewees in this study did acknowledge external factors as major forces for constraint (as discussed in Chapter 6) as summarised by Ian$_c$ who evaluated the use of technology as '*promise unfulfilled*', recognising that although he might '*accommodate it at least within a small scale*', it is still '*unfortunately*' influenced by external structural factors because:

> 'To be *realistic* …once you start to tease apart the *reasons why*, if I'm being absolutely brutally honest its about *changing cultures*, as we know one of the hardest things to have an influence on. And the system, the education system itself carries an awful lot *of inertia* … so the *organisational structures* aren't very *accommodating for overall change*.'

Continuity and hierarchy. Some more recent academic study focuses, less on resistance to technology than its *assimilation*, re-interpreting the historical and political perspectives that inform Tyack and Tobin's analysis (power of elites) of why some reforms are assimilated and others marginalized. Although the *grammar of schooling* thesis does not extend beyond the 1970s and hence directly into the educational technology era (under investigation), this research offers some understanding of the way in which digital technologies have been enrolled, as opposed to radically redefining or undermining existing organisational structures and practices.

Several academics have explained this dichotomy by identifying a conceptualisation of a single *homogeneous* whole school culture as overly simplistic and a small body of sociological based literature identifies a diversity of

interests, exhibited through a range of identifiable sub cultures. A view highlighted in Tyack and Tobin's (1994: 476) explanation of what shapes organisational patterns, albeit in language, portraying its historical analysis; being 'the historical product of particular groups with particular interests and values at particular times.' The highly *conflicting* and adversarial nature of various cultures and sub cultures based on different rationales and motives is particularly emphasised in some UK based studies (Selwyn, 2011b). Ball (1987) and Goodson et al. (2002) for example interpret schools as sites of struggle, often highlighting conflict between the interests of the wider organisation and its individual actors and into which, they argue, technology, is merely co-opted. Goodson et al. proposes, consequently, that technology can be perceived as entering a school arena of pre-existing inter-cultural struggle, with respective stakeholders utilising it in age-old battles, in an attempt to redraw the borders of institutional control in their particular favour.   My research confirms this interpretation to some extent, suggesting that educational technology has been assimilated by a whole school organisational culture, into which disciplinary structure and administrative subculture have been subsumed; effectively disempowering a traditionally more independent academic subculture in the process.

   Organisation rationale and authoritarianism.   The explanation of continuity in terms, not of elites, but of entire organisational rationale by the American academic Hodas (1993), offers some insights into the research findings. His perception of the school as a workplace with unsurprisingly pyramidal powers structures, authoritarian culture, and privileged information access due to its socialisation and disciplinary functions is supported by well-established (Marxist and 'hidden curriculum') interpretations which explain structures in functionality terms. The latter are exhibited through features which reflect profoundly conservative norms and values, aimed at instilling acceptance and respect for hierarchy in society, competitive individualism, division of knowledge into segments and 'receptivity to being ranked and judged' (Dreeben 1968). Values significantly shared by other large-scale institutions, including big business and government (Hodas 1996). This essentially political interpretation is supported by Goodson et al. who regard schools as 'socially constructed mechanisms' producing positions from which to understand the world in terms which are which strictly controlled with categorised *goals*. Focusing more explicitly on its

educational functions, institutional design (in rationalist terms) is interpreted as optimising the job for which it has been entrusted; maximising outputs (school graduates, skilled workers, patriot citizens,) by utilising a given set of inputs (money, students, staff, legal mandates, public confidence).

To some extent this research suggests that the introduction of educational technology appears not to have fundamentally altered structures or goals, acknowledging Tyack's earlier assessment of the school inculcating values and practices which facilitate its primary function while minimising and eliminating others. While some interviewees suggested that their personal purpose was to '*develop well-rounded human beings*', the values often articulated were pragmatic with respect to addressing the realities of future employment in the modern world, albeit through collaborative learning to foster team working skills or competitive attitudes to succeed in a public examination system; to develop, as one head teacher, described '*lifelong learners*' who was '*independent, collaborative and resilient.*'

Hodas (1993) argues, however, that authoritarianism is a partial interpretation of the organisation's goals which does not always behave in a rational, deductive means-end approach manner, because it has other objectives and identities. His thesis purports that the school's primary purpose, is one of self-preservation, achieved by the employment of the norms and procedures of entrenched bureaucracy (based around status and authority) in order to perpetuate itself. This reading explains the organisation's innate conservatism and the manner in which digital technology is naturally resisted or used within it. Consequently, he speculates that although the application of educational technology may be presented, as an improvement by advocates, the organisation, (exclusive of teachers) will resist what it perceives as disruptive to its cultural values and habits. Goodson and Sikes's (2001) UK-based empirical studies support the analysis to the extent of envisaging the school as a socially constructed mechanism, accepting of some change, but utilising technology to service its self-interest, expressed in terms of status and authority maintenance.

For Hodas the 'failure' of digital technology to alter the look-and-feel of schools, contrary to expectations, is consequently neither unsurprising nor unsuccessful since it results from a mismatch between the values of the school organisation and those embedded within the contested technology' which may seek to subvert it (Hodas 1996:1). Despite rhetoric, the organisation's purpose, he

argues, is not educationally focused to radically change pedagogical practice and will only be employed, in a manner which fits in with (or is sufficiently flexible) or does not threaten the school's existing social purposes. Thus any technology which enhances the teacher's authoritative position as information source, and reduces the physical effort required to communicate written information (e.g. upgrading the blackboard, duplicating machine and overhead projector) so that more energy can be devoted to the non-didactic tasks of supervision, arbitration, and administration, is assimilated. An interpretation supported by a body of literature (Eraut, 1991; Cuban, 1986) which portrays the adaptions of 'old' (chalkboard, overhead projector, print encyclopaedia) to 'new' educational technologies (whiteboard, PowerPoint, online resources such as Wikipedia) in terms of linear progression (Selwyn, 2011b: 91).

This research confirms that the contested whiteboard can be interpreted as equipment originally mandatorily imposed on teachers and positioned (at the front of classrooms) to replicate traditional authoritarian-surveillance management and didactic styles. As illustrated by Daniel_b's explanation of the link between and adaption of, technical equipment for classroom control:

> 'The *first bit of technology* I used regularly in a classroom, other than I suppose strictly speaking a *board and chalk, was a whiteboard*. A communication technology still around was overhead projectors and ...one or two of my *favourite lessons; my Ofsted lessons*, involved the interesting use of overhead projector overlays and they also had the *great bonanza* that you could *pre-prepare* things at home and if you had a *difficult class* you could *face* them, you didn't need to turn round, turn your back, which was one of the *golden rules* when you are starting out. I tell that to trainees. *Why do you keep turning your back?* Of course they *misbehave*. Face them and technology suddenly permits you to do that so'.

However, most experienced respondents demonstrated considerable personal adaptability towards technology reflecting the integration of equipment with preferential teaching and classroom management styles. The latter, as senior professionals suggested that they naturally resisted attempts to be dictated to by technical equipment and top-down enforcement policies (e.g. interactive whiteboards) were generally perceived as unsuccessful, with equipment being partially used or ignored, as Steve_a, (director of IT) explains, who prefers positioning himself at the centre as opposed to the front of the class:

> 'We're carrying out a *lot of research with whiteboards* and I've no idea if people are using them other than as a projector screen. *I don't think they are being used at all* and we've being doing research, interviewing key members of departments and *I don't like interactive whiteboards* because

it ties you to the front of the room. I'm using this new [equipment], I'm *projecting this to two screens while standing in the centre amongst students*, using this *fantastic* stylus and everyone can see it. So much better *than being tied to the front of* the room with an interactive whiteboard.'

Several studies (Honey & Moeller 1990; Kerr 1991; Sheingold & Hadley 1990) have focused on the consequences of technology which is perceived as threatening to the teacher, for example the anxiety generated by an unfamiliarity and incompetence with the new machines supporting Hodas's assumptions that the fear of being *embarrassed* is a major de-motivating factor in the acquisition of the skills required to utilise computers in the classroom (Hodas 1996: 11). However, this research and personal experience emphasises that disruption is 'feared' by staff because it is not tolerated by the organisation's authoritarian standards and leads inevitably to disciplinary action 'failure' assessments for probationary teachers and dismissal for NQTs.   As several interviewees observed this leads to a '*no risk culture*' due to constant 'excessive' internal and external monitoring (Ofsted) with the flexibility offered by technology actually constrained, with experimental and exploratory work confined to the younger, non public examination years and undertaken by experienced staff. Younger staff in particular were perceived by some middle managers to lack the freedom to both adapt technology and to utilize their technical skills fully ('*good ideas but they're frightened to use them*') as explained by one Jack$_c$:

'[Student teachers] are certainly incredibly competent technologically and I think working within *constraints of the systems* that we have means that they tend to kind of fall in to what we tend to do here, so lessons will be *PowerPoint based* and also the fact that they are student teachers often they don't want to take *risks*. So whilst I think they could quite clearly have *greater competency* I think they tend *to not use* that perhaps as much as possibly could.'

In this conceptualisation school culture is consequently understood in terms of the exercise of power by the processes and procedures at the organisation's disposal, exercised via coercive power (inflicting punishment), reward manipulation (promotion, demotion, dismissal), expert power (derived from superior skills and competence) and legitimate power (sanctioned positional authority) over individuals which include teachers (French & Raven 1968). Moreover, it is a model which interprets teachers as situated at the bottom of the pyramid in terms of pay, prestige and formal autonomy. As Fullan (1991) emphasises the powerlessness of teachers is crucial because they are not perceived

to be part of the whole school organisational culture (in comparison with state and district administrators), despite a rhetoric and discourse which encourages teachers to believe otherwise.

Hodas's analysis has been criticised for appearing socially deterministic; a counter view would propose that schools do not necessarily operate as rational actors in pursuit of perceived goals. Moreover, Selwyn (2011b) observes that it makes little sense to argue that organisational culture determines completely the use of technology but that it is just one aspect of the social shaping of school's technology. Several commentators (as discussed above) argue that organisational culture is certainly not monolithic. Ball (1987) notes that schools are arenas of conflict, where the battle of micro-politics is a frequent feature and that one cannot assume that technologies can be assimilated unproblematically into their bureaucratic organisations. One might however, extend the analogy, to reason that in battles there are inevitably winners and losers and that the relative strength of each faction should be acknowledged. Although social shaping factors may be multiple, they are not necessarily equitable, with some welding more influence than others and at different moments in time.

Information control and administrative subculture

Hodas's argument that digital technologies are used to strengthen administrative values and control over teachers is supported by some sociologists who discern a distinctive link between organisational use of technology and the growth of school bureaucracy and administration (Selwyn, 2011c). Several academics within the field of educational studies have contrasted the limited use of digital technology, for example, in the contemporary classroom with its ready absorption in the school's administrative systems; established in new data processing regimes of scheduling, grading, tracking and communication activities with an emphasis on reporting, measuring, monitoring, assessing and accounting (Griffith & Andre-Bechely, 2008: 40). One head of psychology in this research 'imagined' it as the '*main way*' technology was used in his school. Deem (2004) and Bromley (2001: 41) observe how schools, managing their own budgets are expected to function profitably, utilising technology to process larger numbers of students cost efficiently; yielding higher levels of measurable performance with little or no increased expenditure enabling 'more learning to happen without

hiring more teachers' Bromley (2001: 41).   Within this literature, however, explanations are presented in a traditional technological deterministic and beneficence discourse. Economic efficiency and modernisation arguments purport the logical application of technology to the rationalisation of manual administrative tasks (aiding the collation and communication flows which keep schools functioning), with no subversive agenda intended.

Whilst most interviewees appreciated the saving in 'time and energy' provided by ICT assisted administrative tasks, they also, as one head of history articulated, described it as a '*double-edged sword*'. All middle managers cited the exponential growth, not only in terms of the creation of non-teaching administrative appointments (of which ICT managers were one element) but also in the multiplicity of administrative tasks that they were personally expected to undertake, with no extra resources (beyond computer) in terms of time. As Richard$_e$, a union representative observes:

> 'One of the big problems is that now reams (or perhaps *gigabytes*) of *data* can be *churned out* to set *meaningless* or inappropriate *targets* just because things can be *measured* and teachers are being *treated like sales people* or factory workers producing a *produc*t.'

Andrew$_a$ attributed his move into another '*element of education*' because of excessive administration:

> 'I think that *was part of the reason I left the classroom*. It's become more about paper pushing and I think everyone would say that these days. Paper pushing whether in the digital sense or whatever, and being required to produce evidence of everything that takes place, produce *a paper trail* and *becoming accountable and being judged externally*. All of these things weigh heavily on teachers' minds. We are required to built up the evidence portfolio, I guess. So that occupies an increasing amount of *teacher's time*.'

This research also evidences what some writers have previously suggested as the development of the primacy of digital administrative tasks over teaching (Readings 1996) through the intensification of digital and 'excessive documentation of actions which deflects 'energy and engagement from meaningful educational processes' (Perelman 2014: 224). The shift in schools away from its traditional educational ideal of promoting reason, culture and enlightenment towards administrative and efficiency purposes has been expressed in problematic terms by several professional associations and by the trade union representatives interviewed. Ironically, several mangers observe that the

secondary consideration now granted to professional and pedagogical concerns is in marked contrast to the experimentation and innovation that accompanied the earlier introduction of educational technology. A conclusion Cooley (1999) expressed, when warning that *New Managerialism* leads to a depersonalisation and dehumanisation of the entire teaching and learning process together with its individual participants; a prospect to be avoided at all costs as perceived by one ex head teacher; '*otherwise we might as well be communist Russia, school No 6732 Leningrad, and be done with it.*' Some participants (with a statistical bent) noted the direct link between numerical data, increased administration and technology, as Carl$_e$ notes:

> 'It's a crude tool isn't it? But I think it was used in the sort of things that were easy to *monitor* from it, from *staff absences* to *exam results*, where they took *no account of the ability* of the pupils that you had. It was easy to monitor what staff were doing *outside of the timetabled lessons* because it is easy to see on a *spreadsheet or databases* what else they were doing. In terms of…*reporting systems with tick boxes* it's so easy to check and I've no idea..what *records* were kept of it. But *nothing would surprise* me in terms of that.'

The former explains further how the need for quantitative figures to demonstrate achievement, drives a non-experimentation culture:

> 'I think the *external pressures* on *producing performance* whether they come from school leaders or from government are having a significant effect on the *innovative* approach that people would take in school. *Risk* it; have a go. I think in our hearts, school leaders, that's what we want to say to people, but there's a *massive nervousness* about *delivery* and performance.

Several senior middle managers referenced, fondly an era (1970s, 1980s) in which UK school administration was perceived as traditionally subservient to educational functions; teaching and supporting teaching staff, while administrator's tasks were subsumed within the responsibility of head, deputy head or senior teacher role, usually supported by a small secretarial team. Ethan$_c$, a head of history notes how in the current climate administrative tasks were; '*detracting from the time for preparation and marking which again ought to be higher on the priority list than it is*'.

Some educationalists and sociologists, however, offer an analysis of this trend within broader political dimensions, not least to explain the evident growth or multiplicity (as opposed to intensification) in all administrative processes in schools. Middle managers in this research certainly perceived much of their

administrative work and data analysis to have no particular educational relevance or value. As Carl_e, chief examiner, observes:

> 'In terms of *exam results…*it's alright *doing data* analysis, but surely the *purpose is to improve teaching and learning* and if that's not happening then *I can't really see that value of it*. Directors of studies, deputy heads whatever *pouring over* A Level, GCSE or Key Stage 3 results and then what's coming from it that's going to improve the teaching and learning and I don't think very much.'

Selwyn (2011b) argues that these processes and constraints should be viewed within the context of the neo-liberal political agenda that has dominated British politics since the 1980s (developed in Chapter 6).   In this light public education has been subject to a deliberate state policy of transformation along private sector entrepreneurial lines, expressed in the adoption of economic–led New Public Management systems based on the state's response to perceived threats of globalised economic competitiveness. The internal logic of the political and economic argument is thus expressed in a new managerial discourse, derived from the for-profit sector and using the language of efficiency, rationalisation and spending reduction, which as Deem argues, based on research into UK universities and public sector institutions, represents education as an input-output system which can be reduced to an economic production function (Deem 1998, 2004, 2013). For Hodas (1993) such developments reflect organisational political power, albeit exercised more subtly than a conscious plot to consolidate hegemony.

This conceptualisation offers a more complex analysis of schools whose constituents have differing interests, with technology favouring one faction at one particular time and one which Olssen & Peters, (although referencing higher educational institutions), interprets as a process by which management controls its labour force, via de-professionalism of its teaching staff (Olssen & Peters 2005).

Neoliberal management and de- professionalism

This study found perceptions of teacher de-professionalism to be of major concern amongst middle managers, confirming Olsen and Peter's analysis based on an interpretation of educational organisations, not simply as bureaucratic and hierarchical structures, but as organisations staffed by professionals. *Professionalism* as orientated in the idea of a power legitimately granted to the subject and of the latter's ability to make decisions freely in the workplace, (subject-directed power) based upon the liberal conceptions of rights, freedom and

autonomy' was perceived as threatened, if not entirely eliminated. 'Consequently, no professional wants to have the terms of their practice and conduct dictated by anyone else but their peers, or determined by groups or structural levers that are outside of their control' (Olssen & Peters 2005: 325).

My research indicates, however, that whilst several middle managers claimed some influence in the decision-making process many perceive an increasingly fatalistic powerlessness and subordination in the management of their departments, with four interviewees citing management change as their primary reason for leaving the profession. As Jack$_c$ noted with respect to any future planning emanating arrogantly from senior management; '*not an awful lot of things are sought [from middle managers] or decided upon; these are the best way forward and we don't get much input.*' Some participants articulate alienation towards the upper echelons; issuing '*diktats and decrees from on high, from a narrower and narrower senior management team*' and utilising a '*plethora of directives...much more to manage and control*', while new management systems are viewed as 'other or alien' and regressive. As Justin$_a$ expresses:

> 'There seems to be this *new* management style that *isn't consultative* that isn't *collaborative* and it seems to be a change, that we've gone *back*, when we used to think, we were moving forwards, it's a sort of ...American or a business model that's come in.'

The three major features attributable to de-professionalism by Olssen & Peters (**Figure 4**) were all identified by participants in this research. His thesis explains these developments in terms of the inherent conflict between neo-liberalism and professionalism; the former interpreting professions negatively (as self- interested groups indulging in rent-seeking behaviour), to be constrained by a 'patterning of power, established on contract, premised upon a need for compliance, monitoring, and accountability and organized in a management line, established through a purchase contract based upon measurable outputs' (Olssen & Peters 2005: 325). This *New Managerialism* model contrasts starkly with the traditional 'liberal style experienced by many of the professionals interviewed, in their early careers (1980s), based on principles of autonomy, delegation and underpinned by relations of trust (Chitty, 2009). For Olssen & Peters (2005: 324) it is unsurprising that de-professionalism is perceived under a system, where the principal-agent line management chains have replaced delegated power and hierarchical forms of authority-structured relations have eroded 'an autonomous

space from emerging.'

Figure 4: Olssen & Peters's three features of de-professionalism (adapted from Olssen & Peters, 2005: 325)

1. Shift from collegial or democratic **governance** in *flat structures* within departments, to *hierarchical* models based on dictated management specifications of job performance in principal-agent *chains of command*.
2. Increase in *hierarchically* imposed **specifications** by management over workloads and course content by management, with targets and performance *criteria* being set from *outside the subject department*, eroding traditional conceptions of professional *autonomy* over work, deconstructing the space in terms of which professional autonomy is exercised.
3. Redesign of traditional **conceptions** of professionalism involved as an ascription of *rights and powers* over work in line with *compulsory* adaption to *market pressures*.

Investigation into the correlation between the introduction of neo liberal organisational arrangements with the development of educational technology in UK schools is limited, although a relationship between the two is often assumed; the former requiring the performance data (as accountability criteria) created and manipulated by the latter, with all schools compelled to use digital technology tools in the process. The changes observable in teachers daily working practices however, has, led some academics to argue for a direct link between technology and neoliberalism processes. Kupchik and Monahan, (2006) for example, suggest that technology is used primarily to reinforce accountability regimes and audit cultures that privilege the production of evidence and documents; video recordings, spreadsheets or test scores over other activities and outcomes. Interpretations which this research confirms, as mathematician Daniel$_b$ suggests, in his correlation between the ease of 'meaningless' quantitative data manipulation with the 'false' image of organisational effectiveness:

> 'I think we spend an awful lot of *time* looking *at numbers and spreadsheets* and *putting dat*a into spreadsheets and *moving data* from one spreadsheet to another spreadsheet, to another database*, analysing* it and *spinning it round* and looking at it and I think because data (and I use data in the broadest term of information and numerical data, numbers in boxes) is so *easily recorded* and manipulated by spreadsheets and databases, and because it will generate so many *subsequen*t bits of data, so you can use that phrase which I hate, *drill down and unpick*, see what's going on, there is a *pressure from on high* sometimes to do a lot of analyses on data sets which are utterly *meaningless*.'

Several middle mangers perceived a significant transformation in schools from a professional culture which facilitated relative, open intellectual enquiry and debate (via wide range of face to face, consultative processes, departmental meetings, staff meetings, heads of department meetings, working committees etc.) to a de-personalised, mechanistic audit culture (based on new contractualist norms and rules), where senior management, under pressure of performance accountability (efficiency and profitability) utilise technology to control teachers. Nick[a], head teacher notes how a single technological device (e.g. laptop or tablet) with the potential for creative use in the hands of middle managers has become a tool for centralisation; a controlling conduit to for the bureaucratic institution:

> 'I would say that the device that people have is not only a *device* that they can use *creatively* (work with pupils,the resources that they produce). It is also the device which is the *conduit of the central bureaucracy* of the school *pushing, out information*, *pushing out communication*, *demanding response*, *pushing out requests for data*, which has to be collected and then *re-pushing* out the results of that data collection. Actually a lot of what the devices have done in schools is to *extend* the bureaucracy, not limit it. Culling them to do things in the way that school wants them to be done. This is the way we are going to do this now.'

Some senior heads of departments noted the change in evaluation criteria (in terms of '*public good*' and the language and values of human relationships) to those based on '*outcomes*', significantly expressed, no longer in comparative terms with other institutions, but in impersonalised numeric form as targets and benchmarks, educational processes which some academics (Ball 2007; Hamilton & Freenberg; 2005) have equated to factory operations with 'through puts' and 'outputs' (e.g. number of good GCSE results obtained irrespective of student ability) and with increased standardisation of content, assessment, target-led performativity, and official inspections. While acknowledging the legitimacy of oversight ('a *need to know what your staff are doing*') Matthew[c] , whose school had recently introduced a '*brand new shiny*' performance management software (*Blue Sky*) articulated both a concern with the general inadequacy of human measurement and explained the ease with which senior management could now monitor from their offices:

> 'I think *all performance management systems*, whether they work on the basis of a computer or a bit of paper are all subject to *vagary*, and I sometimes think SMART targets can be really *dumb*. Because sometimes the most useful objective you can set for somebody is not necessarily going to be *readily measureable,* but you *have to* put something on a bit of paper, whether in a spreadsheet or a form, put it in a box which you can

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say *yes* you have met that, or *no* you haven't met that. Its all *logged* and it certainly has *huge management benefits* because they can now just look down and at the *click of a button* they can say right, so *43* members of staff have had their *video appraisals* but *61* haven't. Hum, what's going on there? So the dead head of bureaucracy or *big brother* make that much more effective.'

Perelman's (2014) qualitative study of the application of technology to neoliberal educational reforms in Israeli schools via digital Management Information Systems (recording daily performance data such as attendance, reports, marks, targets, discipline, conversations and appraisals) is particularly insightful for this research. A concealed neoliberal agenda (of accountability, efficiency and transparency) he concluded was presented as empowering teachers (enhancing data administrative efficiency) by creating a sense of responsibility for their own work, while clearly disempowering them. Feelings of fault (vocalised as 'pressure', 'fear', 'criticism') and inadequacy were cited by teachers who criticised the punitive nature of the system in recording only strictly measurable variables (examination grades, absence rates etc.) while misrepresentation and falsification of data was induced, based on issues of fear of consequences (e.g. non recording of disciplinary incidents by NQTs to improve their assessment record or embellishment of absence, discipline and performance related inputs) and cynicism over the system's integrity.

This research found similar criticism of technology driven management systems as professional judgement and ethical practices seemed to be overshadowed by the increased pressures of performativity. Owen[b] empathised with his middle managers concerning the de-contextualisation of the process; '*I think I can see how teachers can think that their own professionalism and approach is questioned by the issue of targets which are set externally without due regard to the context they're working in.*' While Andrew[a] highlighted a key feature of de-professionalism whereby; '*we're expected to maintain our progress against agreed targets. Is there no room for professionalism one might argue? Can people not be allowed to manage that themselves and know when they're making progress and so forth?* However, several managers expressed dissatisfaction with a disciplinary climate in which they and their staff were in Roberta[c] 's terms '*berated*' and '*infantilised*', a style which facilitated Carl[e] 's ultimate departure from the profession:

'I mean I think one of the reasons for getting out was the management because you were getting staff called in and given *warnings* most *weeks* and I was waiting for it. I was counting myself lucky that I had got parental support. So, I'd expected to have *been carpeted* a few times and been on final warning or something …because of not *toeing the line*.'

As Ball (2003: 222-6) observes in such performance driven organisations misrepresentation is a matter of routine since performativity requires teachers to set their authenticity aside and focus on 'producing measurable and 'improving' outputs and performances. 'Effectively, rather than honesty, is most valued in a performative regime.' Several senior interviewees certainly articulated an embedded cynicism when discussing procedures considered to be dubious in terms of their inability to measure what they were purporting to record. Daniel$_b$, a head of mathematics, relates this development to the power of numbers to restrict normal evaluative thinking because '*what computers generate is numbers and it can actually de-skill people's thinkin*g' in comparison which paper resources where one is more likely to question its provenance (*where does this come from?)* concluding:

'I think in a way we created a rod for our own backs by generating all this data, which people will then *abuse,* sometimes *willfully* but much of the time I think you're looking for a *quick fix or an easy interpretation* to put on things. Usually what the *numbers tell you is not at all clear*.'

He elaborates by emphasising how superficial processes such as colouring numbers on a computer screen, have a disproportional effect on management reception:

'When *a number appears on a computer screen in* colour, I found this with my own senior management, I was the one who introduced *multicoloured spreadsheets* for feedback, I started colouring things with red, green and amber for how kids were doing, I get this *effuse, this is fantastic*, you have really got to grips with this and I thought *bloody hell,* all I did was *colour in a spreadsheet* and since then I feel slightly *responsible because every department* in the school is supposed to produce coloured in spreadsheets. Its *not very difficult* but it was just an *idea to get people off my back* and now its taken on a life of its own'.

Departmental subject sub cultures

North American and UK based empirical studies have long evidenced the powerful influence of subcultures in mediating (via shared beliefs, norms and values that establish a normative context) teachers' interpretation of the

curriculum, educational innovation and the consequences these have for practice (Ball & Bowe 1992; McLaughlin & Talbert 1993; Grossman & Stodolsky, 1995; Siskin, 1991). Louis & Firestone, (1997) drew attention to the crucial role departments play in staff socialisation and professional esteem, constituting one of the primary organizers of professional life. Whist this research found that some individuals adhered strongly to subject subcultures, as hypothesized, interviewees cited evidence of growing internal and inter-departmental tensions, including feelings of alienation towards senior management; attributable to the application of technology and technology facilitated management systems. Liam [b], a head of science articulates an inter-departmental division which technology has not affected due to a perceived embedded organisational structure:

> 'Its sad to say but its not just an *organisational structure* which is just *hierarchical its within disciplines*, *silos*, certainly within secondary, so you get *very little cross fertilisation* of ideas. That *working across disciplines just so rarely takes place*. So if you happen to get someone in mathematics who happens to be particularly *passionate about the use of technology*, for them to have an *influence beyond that* to the drama studio or the technology workshop is incredibly *difficult*. *How can a mathematician tell me how to teach technology?* So actually *disseminating good practice, sharing* of it is still quite a *tough call*. I'm just trying to generalize here but the organisational structures aren't very accommodating for overall change'.

Some middle managers' perceptions suggest that shared attitudes regarding subject specific content and practices within departments, identified by Ball & Lacey (1984) as *subject paradigms,* were no longer the norm and that divergent approaches to departmental leadership and teaching methodology have emerged via individualistic interpretations of the application of technologies. Whist the specialist department is seen traditionally as the primary support and communication base for teachers (conferring expert-based status, a disciplinary focus, more collegiate decision-making and respect for individual skills), this research found that the traditional consensus of freedom and discretion in pedagogy was perceived as curtailed: Either through whole school standardisation processes (which heads of department, as the acknowledged spokesperson is expected to enforce), or the accentuation of more hierarchical individual leadership styles, utilising technology as a tool for conformity. The contrast is illustrated in the following two perceptions; the first from Emily[c], articulating a senior middle manager's support (differentiating goals and methods)

for her colleagues' discretion, autonomy and diversity; the second from a head of department, for whom uniform standards are expected to be adhered:

> 'Well I have *a highly professional team*. We are all *very different*, a great team of individuals. I always say to them, you can teach in *your own way* and get the results. That is fantastic. I *don't mind how you do* that you're a professional. You can do that *exactly the way you want*. You know we have the *shared aims*. We know where we're going. We know what we're trying to achieve. What route you take to get there I'm very happy with.'

And from a middle manager, Jack[c], describing the pressure used to encourage the use of ICT within his department as self, internally generated:

> 'The ICT control comes more from *myself. I decide* I'd like to have this electronic mark book. So rather than go and see my individual teachers and say, can I look through your mark book to see progress, I can see it on the *folder* I've asked them to put their marks on. The *only pressure is from me* saying I'd quite like to do this departmentally.'

Whilst Colin[d] and Grace[b] emphasised, positively, access to departmental digital shared resources folders (which could be personalised) others regarded such developments as a trends towards '*standardisation*', with the organisation also enforcing policies which denied the original designer ownership rights. One head of IT, Graham[b], in contrast, observed, despondently how individual members of his staff had become more solitary and self-orientated, relating it to broader societal and cultural change. For him a once supportive, trustful atmosphere of both departmental and interdepartmental support had been replaced in his state school by a culture of competition and isolation:

> 'We've *got staff* and departments *who are independent*. So all members of staff are independent of each other and they fire out these things and say. Oh I'm good I've been on the internet and found this we could use this. Whereas *in the past* it would have *been a shared atmosphere*. Now *its me, me, me.* You get staff that don't want to pass things on. They want to show you the things they don't *want to pass it on at all*.'

North American correlation studies (Grossman & Stodolsky 1994; Stodolsky & Grossman 1995) identifying (epistemological) differences within school subject departments (in areas of curricular control, internal subject coordination, standardization etc.) have been used to infer that subject disciplines are likely to perceive ICT innovation and standardization differently and hence could be either 'facilitating or deterring reform' (1995: 245). They concluded that teachers who saw their subjects as static, well defined and benefitting from curriculum standardisation (e.g. mathematics and languages) were less willing (as

a sequential subject less likely to put students at risk by altering teaching practices and content) to experiment with changing teaching methods than those considered to be have more curriculum autonomy and to be more dynamic (e.g. English, social studies, sciences). This analysis reflects Lave and Wenger's (1991: 110) recognition that any practice-based group participation in technology is significant because 'the artefacts used within a cultural practice carry a substantial portion of that practices heritage, so understanding the technology of practice is not just about learning to use tools but understanding how they connect with the subject's history, heritage and culture'.

Although several UK studies (Gall & Breeze 2007; Haydn 2002; Paechter 1995) have suggested that certain subjects (due to historical norms and values) accommodate digital technology while others battle it, reflecting Goodson et al.'s (1996, 2002) earlier, rather deterministic identification of 'culture clash' between ICT and pre-existing subcultures. A contrary situation was reflected throughout this research, however (and shown explicitly in Chapter 4 with respect to mathematics, languages and English departments respectively). Decisions to engage with (and adapt) technology (when freely actioned) were more complex, relating to individual pedagogy, personal experience, training and access to appropriate working facilities. No interviewee expressed views which suggested a departmental culture whose pedagogy could not accommodate the necessary organisational changes implicit in technology use.

Where interdepartmental difference is evidenced in this research is in the potentially conflicting relationship between the ICT departments and other subject domains. The significance of tension created by the diversion (via Local Management Initiative and National Curriculum) from cross-curricular ICT integration to a concentration of resources and power to co-ordinate other subject areas, into a single technology department, (see structure changes in Chapter 6) is noted by one educational, government ICT expert. Below Philip$_e$ describes the consequence of the policy-enforced removal of subject specific, independent ICT advisory teachers as detrimental to inter-departmental harmony and co-operation due to perceptions of inequity:

> 'I think that was *the biggest mistake* allowed to happen. It actually meant [technology] was shifting away from most classrooms and it became one *subject's responsibility*. All of a sudden it *became the job of the IT co-ordinator and the head of IT*. They deal with the computers so even if you're a history teacher, *you're lucky if you can get access* to a computer once in a while. You might crocodile your class to the computer room

once a term. It's *not really the effective solution* for implementing the technology industry is it?'

Aaron[b], an experienced ICT specialist from a co-ordinating perspective perceived 'technology' to be an 'essentially divisive tool' between departments because of persistent unegalitarian access policies:

> 'The last school I was at put *loads of money into 3 or 4 computing rooms…* but those were *exclusively the use of the business study and IT students.* I was *always a cross curricular person*, so the subjects like maths and science that could use those technologies and get some really good stuff for their kids, never got access to them. So I thought they were a *total waste of time and money*. The people that got them didn't need them, and the people who needed them couldn't access them. That was true in every school I went to even though IT was my subject.'

Moreover, the '*interference*' of a perceived low status, *non-academic* subject head into high status subject areas, disrupted the traditional curriculum power balance which was exacerbated if the individual lacked crucial personal management skills.   Although it was '*hoped that the 'IT coordinator is no longer the head of IT*' and there was a '*big push*' that they '*should be a deputy head or a curriculum deputy rather than someone having responsibility for teaching a subject*' the different perspectives (and tasks) and mutual antagonism between ICT co-ordinators and subject specialists is expressed by many interviewees. As Charles[b] a head of IT and training consultant notes:

> 'I think it *depends on* your person who is the *head of IT*. *Not your departments.* If you have a person *who is a gatekeeper* and it's his/her *domain* you have to go through my system in order to get what you want. That is not *helpful at all* to anybody and they should be taken out and *shot at dawn*. You need to have somebody in IT who is doing it as a *service* to the school. So the *biggest problem that schools* face, and I get this all the time is; we're trying to do it, but the *IT department won't let us do* it and they *don't like* iPads, *they prefer* 'Windows' and they *dictate to you* what you want when *it's your decision* what you want to make it work for you.'

Some studies (Hargreaves, 1994) and personal experience suggests that departmental loyalty, staff welfare concerns and the integrity of the subject, generally overrides any allegiance to the broader organisational goals. Several managers supported the interpretation of Nick[a], a deputy head who perceived '*them as being caught in the sandwich of senior leader's expectations and the need to support their own members of staff.*' As Stodolsky argues (1993), this is because departments develop their own perspectives and professional judgements

which they normally consider to be based upon higher moral values (in pure educational terms) than whole school objectives (market orientated) and which it is expected to uphold in normalised open disputation between the two. This research found an intensification of traditional differences, with several departmental heads perceiving their common culture of professional autonomy and value system upheld an educational social purpose very different from that encompassed by the school organisation's support for the status quo and one to which they were increasingly antagonistic and mistrustful. As Dominic[a] concluded:

> 'I think that was one of the *biggest strains there was. Senior management* I think, although they'd obviously all been teachers, many of them heads of department, *doesn't mean* that they were *good managers*. They also seemed to *forg*et when *they got promoted* of what classroom life was really like. They were on such a reduced timetable and also almost going to be absent from department meetings because they'd got something more important to do. I think their *first loyalty* wa**s** to the *managemen*t *rather than to the department* and I think there was a *conflict*. As a head of department I think you've got a *pastoral role to play whereas* I'm not sure that they necessarily saw the role in the same way. I'm not particularly sure *there was concern for the welfare of sta*ff and I think there was a *massive conflict* and…the best example of this was regards *low morale and high staff absence*. I hope the *departments I ran were collegiate and collaborative* and that *things were discussed and that decisions were reached* …rather than literally *edicts from me coming down*, but I mean in many ways the *role of a head of department was becoming harder* because you were under so much pressure then from management to do various things but *very hard to sell* if you *don't always agree with* it.'

Most interviewees perceived a negative shift in the increasingly top heavy nature of the management pyramid, with an increased number of '*non-supportive*', '*redundant*' managers, for whom they saw no genuine purpose ('*irritants*'; '*preventing me from doing my job*'), beyond imposing unwanted '*standardisation*'. This exponential growth was explained by Oliver[b] pragmatically in terms of a mathematical calculation:

> 'Does it mean more *people become managers*? Yes, if everybody is being *performance managed* and you've got a school like this with 100, 120 professional staff. Well how many people can you really performance manage in a year if have to do *two observations and two reviews* in a year. Well you can probably only do two or three. So you say…we've got 120 staff, frankly we're going to need 40 managers then. We use up your heads of department, *or you end up with the deputy head having 16 people* to performance manage, which is not realistic… so it does create a new *layer of management* if you see it in that light.'

Moreover, several middle managers recognised a distortion in the relative power balance between department heads and senior management (e.g. trade union and local authority support as discussed in chapter 6). A relative functional independence of practice, based on expert authority (competence-based), the perception of teaching as a highly skilled and knowledge based profession, with alternative counter-balancing validations (professional associations, Local Authority Subject Advisors) and a history of resistance (e.g. Protherough's & Atkinson's 1992 study of English teachers and the national curriculum; Ball & Bowe's, 1992 UK case study into streaming and setting in mathematics) had become eroded with perceptions articulated in the language of disempowerment and cynicism towards a rigid, alien, authoritarian culture, as articulated by Daniel[b]:

> 'A lot of *management cultures* since the fall of the Berlin Wall have become more and more *soviet style* in the sense of, never mind about keeping the 'prols' or the customers in market terms happy, or the kids happy. What you have to do is convince your *commissar you've hit your five year plan*; you've exceeded your potato harvest quotas, you've produced the *quota number* of tractors and of course …the whole thing was a *paper sham*. It does seem strange that precisely following the fall of the Berlin Wall, we are creating a *public service* apparently *parallel system to the five year planning system*. Where the important thing for me in performance management is not to impress my commissar, but my *performance manager;* to generate paperwork that will *convince* the *people above* that, yes indeed, you have achieved your *targets comrade* and we can congratulate you and *give your increment* or keep you in *pay*, or you get to keep your *job*, and you get a pat on the head or whatever. You do get an invite to the staff party this year. It is a culture that I see regularly and I have to say having grown up through the *Cold War and seeing the Berlin Wa*ll come down it seems *utterly, utterly bizarre*. I mean beyond *ironic that* our *accountability structures* are leading to a *recreation* of something that did seem to *fail* in quite *spectacular* style and in full glare of the world's media over a period of 40 or 50 years.'

Foucauldian interpretation of disciplinary structure & control culture

For some sociologists (Selwyn, 2011b; Goodson et al. 2002; Brehony 2002; Hope 2009; Shepherd 2009) conceptualising the contemporary school in a Foucauldian perspective as a rigid technology of regulatory control, ordering and normalising relationships around power and domination, disciplining individuals through a daily regimentation of time and space so as to be perceived as 'normalisation', such disempowerment is unsurprising. In this analysis schools manifest a range of the micro-technologies of physical and ideological control through homogeneous-promoting-dividing practices (categorisation and

comparison of *good, awkward, critical or deviant* teachers, high/ low status, co-ordinating departments) and explicit control mechanisms (excessive classroom observation, marking monitoring, staff appraisal) including disciplinary processes and dismissal. Monahan (2005) argues, that digital technology has been enrolled in such organisations to augment and intensify both internal and external and surveillance processes, utilising Foucauldian concepts of the 'panoptic gaze' (Foucault, 1979) not as usually interpreted over students, but increasingly to control teachers (Selwyn, 2011c) in a visible and internally divisive process as Carl$_e$ notes:

> 'I'm *cynical* over this one. Whereas I think individuals *took from technology what they thought was good...* a *tool to help improve learning*, it became almost a tool *to manage you*. You didn't reply quickly or didn't do x, y and z, where were you? And what were you doing you know and so on? …I was very conscious of that as well as a head of department that you could produce *form after form* to send out to your department but what did you *want the information back for*? How was it going to *improve anything*? I mean I almost felt at times that the stuff *I was having to fill in* it was, it could be *used as a check on you*, as if they *didn't trust* you. It was a challenge to your *professionalism* because I *wasn't sure* that any of the information that I was giving them was being *used to inform* any *decisions because they had probably already been made* and they just wanted to *control what was going on.* It wasn't going to help us. Monitoring and so on, *why are you monitoring*, what are you doing it for and what's going to come out of it?'

The capacity of technology for external surveillance is well-established in the literature (Lyon, 2006; Poster, 1995) with Kupchik & Monahan (2006: 265) observing how market logics adopt high tech (technical-fix) industrial solutions directly to complex social problems, such as the shortcomings of the public industrial era school. Few interviewees, however, perceive explicitly the 'subversive' undertones expressed in Hope's (2009) critique of the *risk* factor justification (intruders, vandalism, bullying,) for increasing gatekeeping mechanisms (key codes, identity cards, differential password access) in terms of the application of (non-neutral or benign) digital technologies in establishing a culture of social control, arguably because a discourse of discipline and a self-policing culture has been long established in schools.   Some senior management interviewees perceived their differentiated access to information systems in terms of continuity of normal hierarchical practices. Although several commented on the commonplace use of closed circuit television (at a level comparable, Taylor (2010) suggests, to that found in prisons and airports) usually to survey

individuals in technology 'labs' or libraries, with one teacher explaining how it was used to support her dismissal from a special measures inner city school on the grounds of inability to control disruptive students.

In this research, however, the application of internal control arguments is more relevant to the empirical findings. Monahan's (2005) thesis that the deployment of computer network monitoring systems ('dataveillance') reinforces the ethic of undistracted labour and through intentional visibility encourages self-monitoring and self-regulating performance by teachers is evidenced by personal experience. Senior teachers, for example explicitly describe the various monitoring mechanisms (including the regular checking of emails, initially by IT staff) employed by the organisation, during induction sessions attended by NQTs and new teachers to deter potential litigation-based situations and to discourage private, non-work related communication. Moreover, the perception of working in a constant surveillance regime (reinforcing conformity of behaviour) was acknowledged, as Charles[b], an ICT expert explains while describing how numbers are used to stereotype and categorise teachers:

> '[Teachers] are aware of the fact that they're being *monitored* and we had a lot of schools that wanted to use Moodle in order to gather data about their CPD and their attainment. I think this is the sort of *big brother thing* isn't it. They can use technology in order to gather data *to monitor people*, rather than deal with the tough stuff of finding out if they're a good teacher, they can just get *numbers* and say you're that *kind of teacher*, which they say a lot. I think there is much more of that managerial

Foucault's analysis of the internalisation of regime control via normalisation has been seen as applicable to teachers encouraged and accustomed to institutional practices manifested in regularised habits, rules and orders to be self-disciplining, creating 'docile bodies' of uncritical, self-policing citizens and workers, obedient to hierarchical authority structures and contributing to the productive patterns demanded by the capitalist society the whole institution ultimately serves. An authority that is 'exercised continually around him and upon him and which he must allow automatically in him (Foucault 1979: 227)'. Perelman's empirical research with management systems can be thus interpreted, whereby a process of self-control, articulated in the rhetoric of individual sense of accountability is instilled by management in identifiable stages. Firstly, when management creates standardisation by requiring compulsory recording of actions on the system. Secondly, by recognising that management is supervising them teachers comply with the forced (punitive) conditions. And finally, 'teachers

innately embed the act of reporting and internalize the act of supervision in their own professional identity' (Perelman, 2014:7). The reluctance to criticize, to resist and to rationalize organizational processes was evidenced in the empirical data. Whilst some ex heads of department who had progressed to senior management roles were noticeably reluctant to criticise or even discuss senior management/organisational policies, many middle managers (unable to resist developments openly) manifested and rationalised control policies in terms of their traditional culture of professional self-sacrifice; in the perceived interests of their non-adult students. Consequently this study shows how the capacity of digital technology to permit work from home has merged with the traditional teacher's work and guilt ethic; based on concepts of commitment to care, the open-endedness of teaching ant the persona of perfectionism (Hargreaves, 2003) to significantly intensify the whole working process.

Analysis

In summary, work processes were perceived in terms of continuity with the past although physical structures represented a change beyond simple integration and absorption into existing practices. Facilitation of technology was significantly constrained by environmental factors related to functionability, accessibility and accommodation to the physical environment and maximised via independently actioned human creativity and adaptation. Key technology-facilitated structural changes were identified within the social organisation: Intensification of hierarchy and an (unforeseen) shift in priority from teaching to administrative tasks was directly related to perceptions of de-professionalism, low morale and disempowerment with traditional autonomous, collegiate departmental systems eroded by standardisation (anti-creative/risk-taking) and centralising control systems which prioritised the ethos of corporate identity over traditional educational values and mitigated against professional efficacy and staff welfare.

Chapter 6

Educational Technology at the macro level of analysis

Introduction

This chapter addresses the research question which focuses on factors which have facilitated or restricted the implementation of educational technology for middle managers at the macro level of analysis.   It locates discussion at Layder's (1993) context level of setting and examines political, economic and social factors (perceived holistically and as mutually interrelated in this thesis) which have emerged directly from the empirical research, while acknowledging the role history and the past have played as contributory shapers of social change in the process.

Consequently, this section traces the key structural forces, identified by participants; namely, governmental, commercial (designers, manufacturers, distributors) and parental stakeholders, together with the role of media and societal changes, as pertinent contributors to the development of educational technology over the timescale of the average professional's working life.

To aid clarity, analysis of the whole is organised under the three main political administrations of the period (1980s-2000s) which emerged as experientially significant to the research group, referencing significant political and economic interpretations as raised in the literature. It commences by examining empirical evidence within the political, economic and social context of state policy, under the Conservative, (Thatcher, Major,) New Labour, (Blair) and Coalition (2010-15) administrations, and outlines the theory of a discursive construction of 'educational computing' as articulated by several academics (Selwyn 2002) within which much of the entire analysis is situated.   It then proceeds to discuss commercial influences and parental pressures within a neoliberal ideological context and via empirical findings draws attention to the unforeseen nature of the consequences of state policies and economic and social developments upon the research phenomenon.

Role of government

This section offers insight into middle managers' experience of state policy influence on educational technology developments over their working lives

from the 1980s to 2016.   The emphasis is upon developments and selective turning points deemed salient to the research participants rather than a chronological overview of ICT educational policy. Within that remit, this research confirms interpretations which identify government influence in the development of ICT policy in the form of three basic guises; intervention based on legal regulation, intervention via distribution of resources (particularly financial) and intervention designed to achieve normative change (Selwyn 2011b). Since some academics argue that government has a twofold purpose; the achievement of specific objectives and a wider exhortative function, its policies are seen to both direct and influence digital technology in schools from which several caveats follow.

Interpretations of governmental policy consequences.   Firstly, as argued by Considine (2005) policies do not have homogeneous and predictable effects but rather unintended consequences, often only apparent when polices enter institutions and are acted upon by managers, administrators and teachers. Hence policy has the capacity to produce problems as well as addressing them, particularly 'as third or fourth generation effects produced by previous policy actions and instruments' come to light which are outside state control (Considine, 2005: 21). This research found interviewees to respond to state policy 'seriously' as in Mia$_b$'s assessment ('*Schools had to. You couldn't reject it'*), albeit generally in the negative; grounded in a consensual perception that government was ignorant of educational issues (particularly practical implications) and that policy initiatives were premised on political (including the personal whims of politicians) and economic, rather than educational values, leading to feelings of innate alienation and mistrust as articulated by Dominic$_a$, a senior manager:

> 'They [staff] are *very serious* about it [government policy] but only in a *negative sense*. Successive educational *ministers* are *not well received* in schools. I don't think there's any sense in which my colleagues and the teaching profession in general have *any degree of faith* in what *politicians* are doing. Rightly or wrongly the impression is that there're there for a *short period*. *Education secretaries* in particular tend to be there very briefly and how can they possibly have an *influence over a longer period* of time? They are there to make their *name* for a short period of time and then they move onwards and *upwards* through the *political system.*'

Secondly, as the well-established recognition of a mismatch between policy rhetoric and educational practice demonstrates, implementation is a more complex affair than *a fait accompli* supposition, with organisations either simply

complying or rejecting (Hamilton & Feenberg 2005). Jensen & Lauritsen (2005) argue that they should rather be interpreted within a more specific localized situation, with policy being considered as forged within existing practices. While some academics (Goodson & Mangan 1996) explain the unchanged performance or inertia of schools in terms of the deficiency of lofty idealism, un-delineated and vague, policy statements (creating innovative thriving knowledge societies) others (Jensen & Lauritsen 2005) have interpreted national policies as mechanisms by which key stakeholders (politicians, journalists, school leaders and administrators) continue to act as normal, albeit with increased funding and prominence; effectively enrolling policies into established practices. Ball (1993) has explained the contested nature of educational policy and the complexity of implication by conceptualising it as text which is read, interpreted (re-written) and acted upon by meso and micro actors as it is passed down into practice. Indeed Hamilton & Feenberg conclude that state technology policy conforms to, rather than directly changes the educational technology consensus; allowing teachers, IT vendors, technologists, journalists to continue as they have always done, preferring to address unthreatening issues of resourcing, training and connectivity, rather than more transformative and controversial areas of reform (Selwyn, 2011b: 65). This research found that governmental policies and directives, although viewed generally critically, and introduced at a pace, inherently detrimental (whatever the content) were neither ignored nor absorbed into existing practices, but were implemented seriously, despite detrimental implications.

Thirdly, some academics have perceived policy in functional terms via its role in shaping broader understandings and expectations of digital technology in education, by legitimising and normalizing messages (social arrangements and power relationships) through discursive devices. The use of language to construct thought; via the combination or exclusion of word order is well established in the literature of sociology. As Ball (1993, 1998), elaborates, political power is exercised by the production of knowledge and truth, about what can be said and thought and who can speak and with what authority. Educational policy is thus not only formulated to achieve material effects (exemplified in coercive legislation, Ofsted, League tables etc.) but to manufacture support for those effects (Ball, 1998). Consequently, the ideological (values and implication) dimension and wider mechanisms of the discursive role of government in seeking to direct technology within schools need to be understood rather than just seeking

to analyse the impact or effect of educational policy (Mulderrig 2007). For Considine (2005), public policy is best perceived as trying to stimulate change or maintain the status quo rather than as the direct means of alteration and consequently explains why government policy has unsurprising brought little educational change; because that was not its purpose. This research has found that policy has certainly proved successful in rendering teachers 'voiceless' in terms of both reducing their wider public, social authority and in reinforcing an often self-imposed restraint on criticism or challenges to the status quo and neoliberal economic modernisation (aided by the hierarchical institutions which by definition impose unconditional obedience from staff). The extent to which ICT could transform education (even if this were intentional) however, is highly questionable considering the complex social and economic dimensions of the phenomenon (as previously discussed). What is surprising is that this research suggests that the deterministic thinking which promotes such a possibility continues to flourish within schools and consequently the myth of the educational discourse warrants further discussion.

Construction of educational discourse. Given the non academic foundations of early futurologist theory, the lack of empirical evidence in support of the educational benefits of computing in both its inception and performance and the premise that technology does not contain inherent properties, but is socially constructed, some academics from its inception in the 1980s (de Vaney 1998) have argued that a positive discourse has been constructed by powerful elites (political, business, media) which negates the obvious discrepancies between rhetoric and reality. Several sociologists have emphasised the absence of balanced public debate, the disproportionate media coverage given to positive over negative interpretations of educational computing (Maddux 2009; Kearsley 1998; Muffoletto 2001) and the weak academic credentials of the latter proponents.

Certainly no interviewees could recall any research presented to them prior to implementation, proving a link between educational attainment and ICT and encouraging any 'bottom up' impetus for technology to be introduced into schools. More significantly, none who had embarked on educational practice from the 1980s, deemed any evidence to be warranted, exemplifying a largely unchallenged acceptance of the consensual discourse equating technology and modernisation. Recollections of articles in the widely circulated *Times*

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Educational Supplement of the time, (and its specialized IT supplements) presented computing in an invariably forward, modern and progressive light which they appeared to have internalised. Educationalists who have questioned the value of technology both in its domestic and educational capacity such as Loveless (1996), Furlong et al. (2000) and Cuban (2002), in viewpoints never widely circulated in by the UK press, have often been denigrated as anti-progressive in a process which has continued throughout the 2000s.

Selwyn's (2002) analysis of the historical construction of the computer as a mainstream educational application, from its initial research laboratory and office context via government, industry and media discourse, is (significantly for this study) ascribed to development between 1979-2002, intersecting the period, in which most interviewees careers were situated. In contrast, the concept of educational subservience to economic, political and commercial goals as concealed behind educational policy aims, is both well-established in the literature and widely acknowledged in the perceptions of the majority of interviewees. Don Passey (2014) argued that British policy makers in the 1980s were less concerned with how computing facilities could support learning and 'much more' about issues of future employment. Dunford and Chitty (1999) had earlier credited conservative education ministers with a lack both of actual understanding of educational issues or any genuine commitment to state education. Secretary of State (1979-81), Mark Carlisle, is cited as claiming to have 'no knowledge of the state sector as either a pupil or as a parent' (Ribbins & Sherratt, 1997: 55), a view reiterated by Sir Keith Joseph, his successor from 1981-86: 'We have a bloody state system; I wish we hadn't got one...I don't want it. I certainly don't think Secretaries of State know anything about it. But we are landed with it'. (Chitty in Ribbins and Sherratt, 1997: 80).

Key Conservative educational technology policy developments, 1979-1997

Pertinent to the delineations of this research is the view of many sociologists of technology that 1979 is the genesis and defining period of educational computing in the UK, based on the convergence of key social, political, economic and technological developments (Reed 2000). Educational policy of the 1980s has been interpreted as the convergence of the twin strands of

Thatcher's neoliberal conviction politics; the destruction of consensus-based policy (both economic and political) and the transformation of the British electorate's mindset in the process.

Ad hoc governmental policy and management autonomy.   However, as this research reveals, the manner of much policy introduction into secondary schools whilst perceived as un-consultative and directive during the early 1980s, was widely acknowledged by interviewees to be implemented in a non-directive and highly piecemeal, uncoordinated, fashion, albeit by virtue of its novelty. Despite the confident rhetoric of beneficent technology, government was as lacking in definitive evidence and understanding of ICT implications as the general public, as acknowledge by one expert, Philip$_e$, sympathetic to government policy:

> 'Policy was very *ad hoc* because this was *totally new*. When you discover a completely *new subject* which isn't just a subject in its own right …covering everything you know. What do you do with it? So there was an awful lot of *learning* going on and *government examining* things and testing things and seeing what when on.'

Surprisingly, however, the inconsistent and ad hoc nature of early technology implementation; a cause for instilling life-long negative attitudes in some teachers was viewed favourably by others; in language which reflected a '*liberating*' and '*exciting*' period, where exploration, the satiating of curiosity and '*autonomy*' prevailed. Several managers, with experience of this formative time, while acknowledging the piece-meal, pragmatic nature of policy formulation and the government's limited understanding of microchip technology, as later espoused in the memoirs of Education Minister Kenneth Baker (Baker 1993), did view the period positively (if with the hindsight of later more centralized policy eras). A general impression was that 'ignorant' governments did not interfere sufficiently effectively to create '*harm*', leaving those teachers who were so motivated, free to experiment without pressure and often supported, rather than constrained by government. As one head of IT concluded, the early 1980s fostered a climate in which '*a lot of innovation flourished*' albeit '*very slowly*'.

Several senior heads of department emphasised that the role played by governmental policy in the development of educational technology (positively or negatively) occurred much later in their careers. Although Wilson's Labour governments had exhibited concern over the 'white heat' of technology with 'some 'high tech' policy drives in the 1970s (Selwyn, 2011b: 55), demonstrating

the cross-party nature of discourse, national policy was noted for its effective absence by staff who experienced, the fledging education technology development of the 1970s and early 1980s. Several managers perceived IT usage as initiated on highly individualist terms, reflecting personal interests, (e.g. programming) and skills (often formulated within higher educational institutions), with localized circulation. Significantly, as Chris_b, an IT departmental head articulated, although technologically limited in educational scope, it was a time remembered fondly because '*high levels of creativity*' and '*empowerment*' were facilitated in an environment which enabled teachers as directors and leading agents of change to focus on educational technology autonomously. A process which he explained involved designing, trialing and evaluating personalized teaching materials (a potential later developed under BECTA), often utilising computers and materials which were (of necessity) privately funded, yet within a clear educational and classroom orientation:

> 'I first used a computer in a classroom in *1976*, but it was a teletype connected to the local coal board which was subcontracted to the *Open University*…and all we did was *basic programming* using a teletype which was quite slow but *fascinating*. Then in *1980* I had one of the very *first Commodore Pet computers*…and there were a lot of us about the country who were posting tapes off left right and centre. You'd write a *bit of software* and send it to your friends. That was how it worked in those days and the focus then was *very much the computer in the classroom* doing drill and practice'

The impetus provided by individual teachers was a more significant motivating factor (than state initiatives) in several mangers' reflections of the early period; working alone, with like–minded colleagues, peers and friends or developing research in conjunction with academics; all with an clear educational focus. As in the previous extract, not only was teacher designed programming (a crucial missed opportunity for future software development) evident, since commercial software was rare, but also a recognition of the computer's potential as a wider analytical tool. As Robert_b notes when responding to the limited extent of governmental contributions to early developments in IT:

> '*No, it was me*. I developed the interest in computing when I was at *college*. I did a very, very subsidiary *minor course on computer appreciation*. I sort of picked up the bug and I got into computer programming in a big king of way. I worked with my *English lecturer* at the time. She got a collection of scripts from the children in a writers' competition from the Daily Mirror and she didn't know what to do with them. So a friend of mine and myself we sat down and said we can do

some *computer analysis* of what these kids have written. So *I had an interest* in what *technology could do*.'

Local Education Authority and Advisors role, 1980s-88. Some interviewees did confirm, however, the supportive role played in early developments by the Local Educational Authority. Although such 'local initiatives' were not viewed as formal aspects of 'a high-profile area of national state policy' in the early 1980s' (Selwyn, 2011b), they were regarded as crucial in fostering a positive climate of interest for research and experimentation, by providing both financial and collaborative support and encouragement. The perception of some participants was that being a relatively unknown quantity, and with governmental ignorance of educational technology evident; centralized support for technology naturally took the form, primarily, of nationally funded programmes (described by one middle manager as '*phenomenal in the 1980s*') such as the *Microelectronics Education Programme*, 1982-6, which were channelled through existing local bodies. The inclusivity of such an approach (whether intentional or otherwise) merged existing professional expertise and familiar, trusted training bodies (LEAs) with new professional talent to produce a highly receptive environment for the discussion of new ideas. The high caliber of the individuals ('*exceptional teachers usually and heads of department and sometimes ex-heads*') who as Local Education Authority (LEA) subject advisors furthered educational development, was deemed significant by several managers. An emphasis was placed on the trust elicited by professionals, the range of expertise provided by a '*team*' of advisers ('*one for every subject you could think of*') and the targeted, dedicated, localized ('*patch of schools*') support provided. The role of local authority advisors in contributing to a positive impression of technology, effective dissemination and support at a crucially formative stage (often encouraging and maximizing the potential of talented individuals) was considered of major import by James$_e$, in stark contrast to the inadequacy of school leadership (a continuous theme of the research), in terms of recognizing both personal and organizational potential:

> 'So I think the *key*…is the relationship between local authority and their approach to technology in schools. Way back in the 1980s I had a very *forward local* authority maths and computing advisor and he was very much *to the front* and *ensuring* that *people had little initiatives*. They were *enabled and supported*. He *found the money* and said if you want to try this, do it. So he found the money for this 'Commodore Pet'. The

head teacher hadn't got a clue. Really didn't understand. I was seconded out of the classroom, so my career from 1982 was with a variety of national programmes…doing *in service support*, running computer courses and things for computer based learning really which was computers right across the curriculum. And that was a national funded programme called the 'Microelectronics Education Programme' and their job was just to *promote goodwill* with technology, well computers in schools really.'

The work of local, rather than national bodies to develop and implement a co-ordinated strategic policy (sharing local knowledge) whose purpose was to deliver basic (and costly) hardware and software, technically supported at the local level via centralized funding systems ('*something like 140 local authorities, being the purchasing institutions for 27,000 schools*') was deemed highly significant and effective by Philip$_e$; not least because costly software and their accompanying licenses, necessitated by growing hardware expansion, could be readily absorbed by the economies of scale:

'*LEAs would have a policy for technology* and because LEAs were *large purchasing institutions* then they would probably *buy all the technology* for all their schools and then they were in a position to *support it by buying licenses* for software, *providing technical support* for all of their schools because they controlled the technology. If you've got some kind of policy in the local authority it means schools *can talk to each other* about what they're doing, schools *can share*, you can *share resources*. Local authorities can then license appropriate resources which then all schools can have. It means you can run CPD events *for all your staff* and you know where they are going'.

Local Management of Schools 1988 and neoliberal policy. As proven, well-established organs of (subject) specialist educational expertise, the LEAs and their advisors were well situated to become the naturally trusted source for embracing the uncertainties of change within a context of reassuring continuity and familiarity. Consequently, some interviewees noted in retrospect the highly detrimental effects of the removal of advisors, pursuant to what they identified as the first implementation of a string of externally politically, non-educationally driven, ideological changes, represented by the (neoliberal inspired) advent of local management of schools in 1988, when '*these kinds of things diminished*'.

Chris$_b$ interpreted the significance of this development as '*regression*' and a '*sea change*'. Not only because schools were left '*support-less*' but from a head of department's perspective, because control of whole school technology was handed over to a single subject specialist teacher; usually the head of IT, with divisive consequences for other departments and cross-curricular integration.

Educational technology which had been interpreted broadly and inclusively as a major societal development whose study required contributions from all disciplines, was appropriated by a governmental agenda which re-modelled it into a narrow framework, delimitated by single subject status and constrained by a ideological system which prioritised and valued only its economic potential, alienating a significant body of subject middle managers in the process.

> 'The *local management of schools* meant of course that they [LEAs]no longer had the central funds to employ the advisors and the advisory teachers which meant that *schools* were then *responsible* for their *own purchasing*. They had *to find* their own *support and their own training* and with the best will in the world there was a very, very, *difficult transition* between one and the other and that *affected the way that* schools *saw the role of technology*. It went from being something that *everyone was supportin*g to something that all of a *sudden became the job of the IT co-ordinator* and the head of IT. Usually the same person, but not always. They *dealt with the computers*. It's got nothing to do with me. So even if you're a history teacher, if your lucky you might…*get access to* a computer once in a while'

Economic policy and educational technology. Computer technology in 1979 has been generally attributed turning point status because it was precariously situated at the time; as a relatively un-naturalised feature of daily public life. Some academics have also perceived IT policy making throughout the period in elitist power terms, as merely the consequence of the personal hobby horse of a few opportunistic government members (McNeil 1991) reflecting its inadequate and disorganised implementation. Most participants perceived, cynically, the personal motivation behind much of the '*inconsistent*' and '*contradictory*' policies of educational ministers throughout the period, with Michael Gove, Secretary of State for Education (2010-14) being viewed in this category. However, such personal preferences have to be contextualized within the broader governmental agendas which permit them. The personal IT business interests which arguably prompted Kenneth Baker's strategy for creating a government job for himself as Minister of State for Industry and Information Technology in 1981 can be situated within a national economic climate in the early 1980s, which particularly lent itself to the promotion of a perceived beneficial interrelationship between education, technology and business.

Support of high tech industry, 1980s. The economic dimension of national educational policy for the masses is not novel of itself, with antecedents stretching back to nineteenth century and beyond. However, its priority was not

overtly presented to the public in theses terms and did influence the manner in which educational technology was implemented and understood in schools. Selwyn argues (2002) that the first, if fledging, national 'interest' in 'computers' in education was driven in national terms by the Thatcher administration of 1979-83, within an economic policy context which formulated an 'educational' computer discourse' which was to shape the new educational technologies throughout the 1980s. Economic interpretations of governmental educational policy, he postulates, can be evidenced in the manifold role it was to play in industrial policy as reflected in Kenneth Baker's National Strategy for Information Technology, emerging not from the Department of Education and Science, but from the Department of Trade and Industry (DTI) in which Baker's Ministry was situated. Baker's personal assessment, suggests some governmental awareness of impending technologically based 'social revolution', comparable to the 'early inventions of the Industrial Revolution in the eighteenth century' (Baker, 1993: 64). However, it was narrowly expressed in vocational terms: 'Children had to learn keyboard skills at school, since whatever they were to do in life they were going to come into contact with the microchip. We have to train the young people of today for the jobs of tomorrow.' (Baker, 1993: 61). Indeed, my own training in educationally orientated Information Technology (at Reading University), when teaching in Berkshire LEA in 1989, reflected these views to some extent; being specifically funded by the DTI. Whilst promoting vocational elements; basic wordprocessing, database and spreadsheets skills (to teach students) however, it also incorporated a broader, traditional liberal, humanitarian (and university influenced) educational 'social impact' study which envisaged an enlightened technology-engendered leisured future for UK citizens.

This continued narrowing of technological development analysis in public debate from its political, educational and societal implications (and potentiality to pure economic dimensions) has been attributed directly to governmental influence. A key element of Thatcherite industrial policy, Selwyn argues (2002), in halting economic decline (evidenced in stagflation and industrial foreign competition reversals) was to incorporate a supporting role for Britain's beleaguered computer industry within IT policy. Thus the government was to identify potential applications for advanced systems within its own remit and procure them from British industry with 'educational institutions targeted as key sites for launching the IT revolution' (Selwyn, 2002: 26). The non-educational,

highly political and industrial dimensions of early educational technology policy, particularly with regard to bolstering the UK computer industry, was confirmed by several managers. Charles[b] recalled his experience as one of the first recipients of several high profile, unprecedented centrally funded initiatives; the 'Micros for Schools scheme' of 1981-4 (offering to fund half the cost of hardware, while schools financed the remainder) which basically limited choice (80% schools) to one of two British made machines; the Cambridge-based *Acorn* (*BBC micro*) or *Research Machines* (Oxfordshire), a policy continued through the establishment of the National Council for Educational Technology and the funding of software via the DTI's 'Software in Schools' scheme (£3.5 million) and interconnectivity via the 'Modems in Schools' programme (£1.5 million):

> 'Round about that time there was an awful lot *of politics going on*. It was fairly clear that *big industry* in this country was going to *decline* and the government was looking for things that they could do and of course Oxford and Cambridge, those kind of areas, they had a burgeoning *electronics industry*. So the minister for the Department for Trade and Industry, Kenneth Baker decided that schools should be given *half a computer each*. So the *government funded the cost* of half a computer and *schools were expected to find the other half*. So, from 1981-6…schools were getting computers, understanding what computers could do…It was a *British computing industry* that was being promoted (local authority was totally committed to buying kit from Research Machines or from Acorn) and the target was well, who do we give computers to? *Well lets give it to school*s, so that's how that all came about and thereafter my role was working with heads of department in secondary schools, heads of IT in secondary schools. Trying to persuade them that these computers aren't just for you, there are departments in school that can probably do some really good things with these if you let them.'

For most participants, however, the choice of machine was not overly relevant. More significant was the fact that hardware and software was made available by government funding (at £300/£400; considered too high for the domestic market) and for some it had the distinct advantage of standardisation, particularly in comparison with the problems presented by a variety of equipment post 1990s as Daniel[b] observes:

> 'Lots of people say I could probably have bought a *cheaper computer*, but if you have got a *standard computer* in all your schools then you can support them, you can *buy their licenses and software and so on*. It was a hard time [post 1990] because you know you were running a course about how to use a certain sort of software and one teacher would turn up and say well I haven't got this software and even if I take it away with me it won't run on the computer I've got. So a lot of *time was wasted*.'

However, several IT mangers discussed the significance of improvements in computer design, cheap software and the existence of, a climate of experimentation in schools in the 1980s; educationally focused (since governmental 'interference' was not overt at that time) with a 'lot of disparate technology and it was great because people could experiment they could explore, there were lots of good things going on…with the BBC Micro and Acorn.'   As one Chris_b confirmed with respect to the efficient design of the BBC micro:

> 'So cassettes were cheap, software was cheap, so you had this really nice method of just blending it into a machine and an application with a single task...and it did it well…Its really strange that, so one mustn't forget that the innovation going on was really interesting and it was all about how to use it educationally.'

Although BBC micros accommodated the need for robust and reliable equipment necessary for the school environment, there were limitations as one manager observed with respect to 'spreadsheets or word-processing' applications which required the insertion of a micro chip. For Aaron_b the impetus and 'key turning point' towards maximizing accessibility beyond the mere specialist was via technical design 'innovation'; particularly the development of the personal computer (PC) Graphical User Interface (GUI which Apple had developed in 1986 and which some schools used) which replaced the more inaccessible DOS (Disk operating system), laborious text-based operating system; '*making it easier to use the machine,… the first time UK schools saw graphics was probably the Acorn machines the Archimedes [released 1987] and they were brilliant machines.*'   However, there was a noted time lag between innovation and circulation with DOS still dominating until the GUI more intuitive Microsoft Windows 95 was launched:

> 'So it was DOS for PCs for a *long time from 1990-95/6* and DOS and made it very *difficult and awkward to use* because I remember I wasn't a PC chap, so when I first started to do some PC stuff I found, what am I supposed to do? I've no idea. But by about 1995… *Windows 95* came out.'

General economic policy rationale, TVEI and unforeseen consequences.   A shift towards a more overtly vocational direction in central governmental educational policy was observed by some interviewees, acknowledging academic claims of a re-focusing of state policy from broad education goals to narrower and more utilitarian employment ones (making British industry more competitive and 'keyboard' skilling future generations of

workers) in the 1980s. Fears of 'economic decline' and 'permanent high levels of unemployment' if Britain failed to 'adapt' to the new technology (Baker, 1993: 64) placed education within a traditional skilled labour and employment orientation as represented by the Technical Vocational Education Initiative (TVEI) of 1982, designed by the New Right's chief intellect and architect, Sir Keith Joseph's (also moved from Industry to Secretary of State for Education, 1981-6) which attempted to purge liberal education of its perceived 'anti-enterprise' and business attitudes and values (Hendry, 1989). The message was expressed in the Microelectronics in Education Programme (MEP), utilising £12 million of public funds to promote the use of computers in schools and to develop IT teaching; largely office orientated; word-processing, databases and spreadsheets skills. Whilst the central 'bankrolling' of educational computing model was acknowledged by several middle managers, government, finance as a tool alone 'failed' as exemplified by its short life. However, Philip$_e$ did note the significance of the first attempts to consult with a senior management team and to engender broader coordination by improving the leadership caliber and qualifications of the current co-ordinators of IT:

> 'Technical, Vocation in Education Initiative. That was a first for technology in schools. It was very much about *vocational work*. But an awful lot of money went into that and at that time people realized that unless you're got a senior management team supporting an initiative, your initiative isn't going to be successful. So that brought in SMT making decisions about what is our curriculum going to be? So mid to late 80s ...there was an awful lot of money spent by the *Manpower Services Commission*. So there was a whole range of *TRIST advisors* which was TVEI related in-service training, so there were grants…and a lot of that was used for technology in schools. But that was very much about SMT's need to sit down with the IT coordinator and hopefully the IT coordinator is not longer the head of IT. There was a very big push that an *IT coordinator should be a deputy head* or a curriculum deputy rather than someone having responsibility *for teaching a subject.'*

However, as Dominic$_a$ recalls the direction of initiative at the 'less academic student' resulted in the unanticipated consequence of '*concentrating funds and ICT equipment in the hands of technology* (vocationally orientated) *departments'* and sidelining humanities and languages; the opposite of the whole school access and integration objective, with the IT co-ordinator (as non academic subject specialist) '*denying access to other departments'*. Such specialist and restricted use was acknowledged by Mia$_b$, a head of IT as a feature of the 1980s:

'So in those days the *teaching of IT* was for to *specialists*; an IT person *like me*. And we used to take the kids for IT and there was *very little cross* curricular activity. *Maths* would come in and use some of the computers, but it was generally maths and it would *not be other subjects'*.

Government Educational Policy rationale and centralised strategy; National Curriculum consequences, 1988 Educational Reform Act. Several middle managers identified multiple consequences of the Educational Reform Act of 1988 in the development of educational technology; legislation which is perceived as the first clearly politically (neoliberal) motivated educational policy. As Boyd-Barrett (1990) argues this centralized drive and national policy initiative subtly shifted the discourse from a pure employment opportunity, benefiting industry and the economy argument to an educational one (via beneficial preparation for the information society) and to the specific notion that IT has perceived educational benefits and helps children to learn. Kenneth Baker, then Secretary of State for Education in 1987 claimed (without any verified evidence) that information technology had already shown its potential to improve the education of school pupils (of all ages and in all subjects) in 'New Technology for Better Schools' (DES 1987). Most interviewees, however, (as previously noted) were not overly concerned by any lack of academic proof of the benefits of technology in learning, deeming its benefits to be more '*self evident*' in terms of stimulating engagement.

Although Boyd-Barrett suggests that the National Curriculum enshrined IT skills (with their capacity to enhance, enrich and extend the scope of learning potential) via a cross curriculum ('theme') approach, integrated into all academic subjects via enforceable legislation, several managers noted how educational technology in practice was actually restricted by the very legislation that was in theory expected to promote whole curriculum access. The massive workload introduced by the curriculum changes resulted in '*schools having so much to cope with that technology...was put on the back burner*.' As Philip[e] explained the crucial attainment targets pertaining to technology were limited to only one non-core subject in the whole curriculum which restricted the development of educational technology across its whole.

'*Technology* was more or less *bypassed*. It was *ignored*. In the majority of the national *curriculum documentation it wasn't mentioned* at all apart from the design technology attainment 5 which was IT related and that required technology to be delivered across the curriculum. But because it was actually *hidden in one attainment target in one subject,* in a subject

not many people were interested in, you know, design technology, if you said it was home economics I'm sure people would know what you were talking about. And I think that was the *biggest mistake* that the technology community *allowed to happen*. That it actually came out as a hidden resource again meant the it was *shifting away from most classrooms* and it *became one subject's responsibility'*.

National Curriculum legislation had additional unforeseen consequences which managers perceived as highly detrimental, particularly, regarding the fostering of division and isolation of subject departments and the undermining of co-ordination and co-operation, albeit unwittingly produced by the government (as with TVEI). The creation of technology as a '*subject in its own right*' post National Curriculum review was interpreted as '*harmful*' in allocating the sole responsibility of the IT department to deliver the whole school IT curriculum (expressed in terms of '*finding things out, gathering and communicating information, modeling*'). Charles[b] noted how IT heads interpreted this criteria in a limited capacity, fulfilled simply by teaching Microsoft Office (pre-installed in every computer) as opposed to seeing modeling being better delivered via science simulations or databases via historical databases, ending up with some '*really bad lessons'* and a '*lack of coordination about how the curriculum was delivered and how IT was used across the curriculum*'. Graham[b], responsible for the '*curriculum mapping of technology*' observed the general confusion engendered by ignorance of how basic (graphical) skills were being taught differently in self-contained departments:

> '*I don't think government intended that*. All of a sudden schools had this national curriculum to deliver and *departments saw their bit* and they just had to work out how they ensured they delivered their bit. It's when *curriculum co-ordination effectively stopped*. I mean before then departments *would work together* and thereafter *departments had their own thing to deliver* and that's what they did. So you ended up with kids being really, really, *confused about graphs*, because the *geography teacher* does a cobbled together quick lesson about how he wants his graphs drawn. You've got a *science teacher* teaching *graphs in a totally different way* then you get the *maths* department comes round and tells them *they're all wrong*, it should be done this way as well. So, because they were *siloed,* by the *national curriculum silo*, there was *just no planni*ng really across the school about where these things happened'.

Several interviewees also noted a shift towards a climate of competition, over co-operation (attitudes and values which neoliberal policy and Thatcherite social engineering was encouraged to foster) which extended to relationships with other schools and the subsequent loss of shared expertise and collegiately

designed resources. With the loss of advisory staff, the source and expense of technical support via external consultants became a challenge as Philip$_e$ observed:

> 'Thereafter what schools had to *cope* with was where did they get their *support from*? In the past there would have been a history advisor who would have a feel for most things going on and could bring in decent speakers. The history advisors went to schools and had to provide their own support. And of course that's when you completely *lost any sense of co-operation* with *other schools or sharing*. There were no *resources* being developed *collegiately*...I remember most local authorities had subject teams or subject heads who would get together ... You would have your regular monthly, six monthly, termly meeting and you would sit down and you would devise stuff and you would go away and you would write things to be shared with each other. I mean that had all gone, so you then very much became in the hands of the ex LA advisory teachers who were *now consultants, who you had to pay* to do stuff. And that was hard because you got the advice that they wanted to give you rather than what was best for you'.

Teachers trades unions and end of consensus policies.   The suggestion that elements of centralized control, de-professionalism, constraint, punitive systems and an 'anti-teacher' and anti-union culture, were significant features shaping the development of educational technology policy, post 1988 legislation, was validated by this empirical research. The Conservatives distrust in teachers, local government and indeed any professional bodies is cited by some academics to explain the dualism in education policy, between a retreat from state intervention on the one hand to increased centralisation on the other, in terms of traditional power struggle interpretations (Ribbins & Sherratt 1997; Chitty 1989; Knight 1990).   Evan$_b$ certainly noted the significance of the commencement of a lack of professional trust and freedom in terms of schools, '*now losing the ability to plan and devise their own curriculum*'. Several senior managers perceived a retreat from the inclusively of their professional bodies in general policy discussion and a deliberate omission from the traditional consultative management processes that had been a feature of the tripartite (central, local government and Trade Union, professional bodies) corporatism of the consensus (1945-79) period. Whilst the noticeable absence of teacher involvement in debate or any academic critique was detrimental to the support for new educational policy as Boyd-Barrett argues, it was part of a wider high profile political attack on their role in corporate policy making, the trade union movement and the public educational system in general.

Most departmental heads, to varying degrees, recognized the relative powerlessness of their unions to protect their welfare from the 1980s onwards with many observing their political role being limited to a purely social one; *'primarily organising social functions'* as Victoria[b] notes and certainly never challenging senior management or effectively improving working conditions, consequential to the overload produced by technology. As Liam[b] reveals, workers' rights have traditionally been a secondary consideration to the priority given to children's' interest by the teaching profession itself (hence industrial action is couched in terms of response to education cuts rather than poor labour conditions) which has always limited any industrial response:

> 'I think the unions were *emasculated* some considerable while ago now and I *don't think* there're *effective* in helping...It's hard to argue against an *agenda* of *improvement* so if that is truly the case what kind of opposition can you put up against that? So I *don't think* the unions are doing a *great deal'*.

Philip[e], while struggling to attempt positivity, reflects the more ambivalent attitude of middle class professions to unions during the research period and by citing their continued existence and relative harmlessness, draws attention to their fundamental irrelevance and sense of exclusivity, with non participation less the consequence of shortage of time, than wastage of time from a teacher's perspective.

> 'Well I think unions have still *got lots of members*. In those days I was always a member of a union just because *I wanted to be, not because I wanted to do anything*. There were unions. You had your *one day strikes* but they weren't that *ba*d. I don't know that *Thatcher destroyed the unions*. Even Michael Gove couldn't destroy the unions, even though he wanted to. I mean they *are still there, teachers still belong, but there is much less interest locally in unions*. Its very, very hard to find local *activist groups*. You know you have your long established members who *keep passing the jobs round* each other because teachers have *got too much to do to turn up to union meetings*. So it's much more nationalised, if you know what I mean.'

Centralisation and Ofsted. Several interviewees perceived Ofsted (Office for Standards in Education), created by the centralisation measures of the 1988 Education Reform Act, in Dunford & Chitty's (1999) interpretation as both centralising and via Joseph's model of teacher appraisal 'punitive'. Although ostensibly designed to monitor standards in schools, its neoliberal value system which reduced individual students to quantifiable units of measurement, expressed via examination results (a system previously discredited in its 'Eleven

Plus' guise), alienated professionals whose value system was inherently different. Most of the senior heads of department interviewed had experienced their formative years (1970s) at a time when education and its assessment were perceived in broader terms, (acknowledging the socio-economic dimensions beyond its control), where the onus was on student responsibility for their own achievement and their experience of government was perceived in more consensual, consultative, supportive and unobtrusive terms. Consequently, they were more critical of policy and able to contextualise and identify innovative features of neoliberalism, pertaining to accountability, *external* judgement, and (by governmental remit) *continual* school improvement' (e.g. Parliamentary Education Select Committee, 2010). Andrew$_a$ described his feelings of disempowerment as a senior manager himself with honourable intentions, constrained by the external governmental pressure to implement policies which he deemed both unnecessary and positively harmful to his colleagues. Not only did he reflect the personal tensions created, but also the demotivating effects for colleagues in terms of recruitment and retention by having to demand continual (and artificially perceived) improvement from a staff, driven to exhaustion, who were already doing an excellent job with the resources provided:

> 'The *staff* finished yesterday. Though we've *always been tired* at the end of term, there is no question that people are actually e*xhausted*. That happens *earlier in the term* and it's a question of getting through to it. There's definitely been a *steady decline in morale over the years*. It's also clearly *driving people out of the profession*. And *senior leadership teams*? I don't think any of them had anything but *the best interests* of the staff and the students at heart, but they are *under the same kind of pressures,…to improve*. And they are held *accountabl*e for that school's improvement, so they *push their staff as hard as they possibly* can in order to ensure that we're meeting the *targets* that we're being set as schools...I just had contact with a former colleague who has *retired far earlier than she normally would* do because of the *pressure* being put on her by a new head because of the way that things work. *The constant drive for improvement*. One would always want to be improving but is that *always possible in terms of exam results?* And I think that question occurs in many peoples' minds theses days. How can I possibly *improve year on year on year?* There must be a *plateau?* There must be?'

Younger middle managers, in contrast, articulated views in language which internalised and normalised the prevailing dominance of market values as the only political and economic system experienced.

However, both groups acknowledged that one of the unforeseen consequences of Ofsted was to deflect priority from technological development

towards a concentration of '*just working so they could pass their Ofsteds*' as Mike_d articulates. For older middle managers, this was realized through an awareness of a more directly imposed 'top-down' process of implementation (with a 'closed' rather than 'open and democratic' use of technology) as expressed by critics (Boyd-Barrett 1990; Marshall 2005; Younie 2006). Whilst the introduction of physical hardware (such as the 1980s BBCs) was not perceived in terms of a '*dumping*' or insertion, (as opposed to '*integration*') of equipment in schools, some managers did feel constrained by the climate of compliance generated; a 'stymieing' of their capacity to innovate exacerbated by the specific demands of Ofsted, which generated a sense of 'risk aversion*'* to a more creative and expansive use of technology, which was to continue for most participants (of all ages) to the present day (Mee 2007). A theme predominant through several interviews is the development of, as Henry_c observes, a climate of '*reluctance to explore'* and ironically a need for conformity and security expressed by SMT in terms of examination pressures and the crucial Ofsted accreditation; the link between attainment in SATs (Standard Assessment Tasks) and the prevalence of a highly traditional public examination system with ICT being quietly subsumed. As Ian_c explains the 'big problem' in getting staff 'on-board' with ICT currently in Academies and independent schools is due to '*worries about their top results'* which have major impacts:

> 'What you've got now is *reluctance*. Whereas before you had more ability to *explore* but because of the *pressures of the exams*, it does mean that schools are *less willing to experiment* and explore because they don't want to reduce their exam results or they don't want to reduce that [Ofsted] '*outstanding*'.   So what you end up with now is the complete opposite to what you had before. The pressures of the system have stopped them *from being innovative*. It's more about exam results. [The school] wouldn't experiment with their Upper 6th or Year 11. Whereas in our day, it was just thrown at us whatever happened. At the moment if schools are taught that you've got to do your maths and your English and your science, your language etc. GCSEs, and that's all that's important. And you're not going to get an *outstanding Ofsted* unless you're doing that then that's what schools are going to *focus* on.'

Ironically, the emphasis on meeting league table and Ofsted requirements which was regarded as the major drive of governmental initiative by most interviewees was equally perceived as being central to the detriment of technology development, particularly when the crucial impetus of the examination board favoured the status quo.

Key developments under New Labour Administrations, 1997-2007

While much governmental policy was seen as superficial in terms of its influence in the way that technology is used, '*with nothing in the sense of an overall strategy*', New Labour educational policy was recalled (comparatively) in more dramatic terms by several managers. Whilst some, such as Victoria[b] perceived governmental initiatives cynically, with Blair's 'Education, Education, Education' mantra being attributed the traditional '*throwaway sound bite status*' employed by previous education ministers, for others the changes were significant (albeit negative or positive). As Aaron[b] observed the period '*from 1980 to 1990 was fairly slow and steady but suddenly it's like wow, because the change from 1990 to 2000 is astronomic*'.

Educational technology discourse intensified. Selwyn (2002) argues that developments under the Blair administrations should be understood within a macro-level construction of 'educational technology' which intensified the traditional and earlier narrative portrayal of society and technology, subsuming its societal challenges within a 'restrictive technocratic and determinist' discourse. Its 1997 flagship educational technology policy; the £1.8 billion National Grid for Learning (enabled in the Internet interconnectivity of the DfEE Superhighways for Education) can be viewed as contextualised within a wider *tripartite* meta narrative of the 'computer revolution'. The social rationale being expressed (via advisory documents, the Stephenson Report, Secretary of State, Blunkett's rhetoric) in terms of both expectation (cyberdemocracy and telecommunications access) and fear (uncertainty of the 'information age') in order to coerce public, government and industry to invest in the necessary information infrastructures (Slack 1984). The economic rationale, articulated in traditional employability justification; the development of knowledge, life-long, high-tech skilled workers to compete in a globalised, multinational dictated economy, bereft of national influence. And the educational tenet promoted as the ability of 'the Grid' (reified, from human influence) through a blitz of electronic information (utilising the language of efficiency, targets, standards and discipline) to remedy the national educational malady expressed in falling achievement test scores (Winner 1994).

Consequently, it was advocated as the 'teacher's friend'; facilitating access to resources and good practice (via the virtual teacher centres), reducing workload, concurrently creating more time for students and fostering smarter systems of educational administration and management (Morris 1998). Whilst

several participants acknowledged the positive message outlined, its discourse was internalised by reference to student prioritization and care; equipping them for the harsh realities of employment in the modern world, as exampled by Liam_b, a head of science:

> 'It will *help the children* because, its *preparing them for the world outside*, because its *very much an IT world* and if you don't do it you're going to *let them down*, because you're not actually preparing them for their world'.

Co-ordinated educational technology strategy; National Grid for Learning & British Educational Communications & Technology Agency.

For some middle managers the intentions at least of government strategy were perceived positively. The development of a educational technologies, nationally co-ordinated '*strategy*' and the significance of financial provision (the '*big boost*' from '*huge amounts of money*') at a time when computers were perceived as still relatively expensive, for equitable, universal Internet usage, was recognized as a carefully planned integrated approach: '*I think by mid to late 90s there was a policy and the policy was technology is a good thing...The whole online approach that came from the government was really well-joined up*.' Indeed Philip_e described the co-ordination between the establishment of infrastructure, and internet connection ('national and regional grids for learning') supported by hardware and online resources via '*major project working with software companies*' and the '*right kind of training in place*' as '*superb concepts*'. Moreover, he perceived the lost independent, educationally-orientated, (versus commercially focused) advisory role of LEAs as being replaced by BECTA (British Educational Communications and Technology Agency, 1998 which merged with the NCET; National Council for Educational Technology), the national agency (quango) which, by establishing two-way communications with school staff, promoting the e-learning programme and controlling ICT equipment centrally, actually worked:

> 'Your schools had kit, the *servers were accessible* everywhere, the *broadband actually worked* through the broadband consortia. Government was trying to encourage all learning platforms to actually have some kind of common standards. And of course *BECTA* was there, and lots of advisors…supported BECTA and lots of BECTA staff came out and found out what was going on. So there was advice going back to government about what was best in schools. I thought it was a *wonderful organization*. The staff were really keen. As a *national organisation* they brought an awful lot of people together; good work in terms of curriculum development, in terms of helping schools with procurement…It had a

difficult time because it was constantly being challenged by the department and by lots of politicians, *Secretaries of State*, because they were getting a *lot of advice from big business*,…from the *Apples* and the *IBMs* who were saying this is not the way to go. Whereas BECTA were saying well *IBM isn't actually what schools* need, schools need a much *broader vision* about what technology is going to do.'

Moreover, the *compulsory* nature of many initiatives was perceived as forcing change upon a majority of staff who had previously been untouched by developments. The introduction of email and mobile desktop mobility, with training via the NOF (New Opportunities' Fund) was considered a key turning point by Matthew[c] who considered email to be the '*biggest single factor*' in engaging staff with technology; '*because it forced everybody to become online*':

'I remember doing a lot of staff training in the early 90s, trying to get staff to *engage with the technology*. That was a *difficult thing*, but by the late 1990s, 2000s, the *biggest single factor that made the change was email*. That made a change overnight. The whole way that *people communicated* and used stuff in school it was email. Because you were told…here's email…now you are all *going to use it*. And the *heads* were saying we're going to use it. I think that was a *big driver* because *everybody* came online then and everybody started using technology and of course technology got better then with the *laptop developments*. It was mobility there is a whole lot of stuff about *desktop mobility* and the key things that came about was the development of technology for it to become *easier* for teachers to start using it.'

Educational technology training. A major criticism, however, from most managers in undermining the enthusiasm and open-mindedness that suffused the reception of educational technology development in the 1990s was the wholesale inadequacy of the practical implementation of policy, particularly the poor quality of training provided under the New Opportunities Fund which Ella[b] encapsulated succinctly; '*For so many, training's rubbish*'. Repetitive and negative experiences of training was one of the key factors suggested by both Susanne[d] and Grace[b] in demotivating and undermining self-esteem. As Philip[e,] as an ex deputy general secretary of NAACE (previously complementary of NGFL) acknowledged; '*well you're doing it wrong, this is the wrong training, this is the wrong resources*'. Several managers noted the mismatch between hardware provision and training, rendering as Evan[b] recalled '*the drive to get whiteboards into every schoo*l' unsurprisingly ineffective in terms of usage. Consultation over, and support for, interactive whiteboards was considered to be generally inadequate or in some instances non-existent, with staff returning from vacation to discover like Evelyn[b], their traditional boards replaced with new equipment, or

their '*PC suite changed to Apple overnight*' which they were unskilled to use. Some mangers like Evan[b] described how once '*new*' technology was invariably '*locked up in cupboards*' because it was considered as '*just a gimmick*'; poorly designed and inappropriate for educational function. ('*We bought these quiz things, where you pressed your buzzers and they took 20 minutes to set up. They just sat there doing nothing*'). The theory of past negative experience's ability to inhibit future engagement with technology (Cuban et al. 2001) was confirmed by many interviewees. Evelyn[b] reflects how enthusiastic intention (and funding provision) to develop 'creative' technology skills was frustrated by practical experience which engendered future, prolonged feelings of poor self-worth and failure:

> 'We had a staff meeting with the head of secondary in the special school who was a computer *expert* and he, I think, introduced a huge number of items of software and hardware to the staff; *hour long twilight staff meeting*, none of which of course we were going to be trained in, in any way. There was definitely money available but you were definitely expected *to train yourself in IT*. I love IT but it's quite daunting I think to be failing. To be feeling that you're *failing all the time* with IT because you're *not being trained* in any of them. I think there was a rationalisation there which was you can't train people in IT really because they are all at different stages and they've *got to find their own way*'.

Coalitional and austerity policy 2010-2015

On the one hand most participants considered government financial support for educational technology to be in significant abeyance from the 2010s with negative implications for resources, training and evidence of a growing inequality in provision and working conditions between independent schools and academies (and colleges). On the other hand the retreat from governmental policy interference was halted by Secretary of State, Michael Gove's '*intrusive*' reforms, which from 2013 were perceived negatively in the traditional 'personal ministerial whim' model of policy making.

Alienation and disempowerment levels. Several mangers were significantly alienated by government ICT policy which appeared non-consultative and reflected a contempt for themselves as educational professionals. In illustration and although foreseen as part of the Conservative government's anti-quango policy, the '*closure by Michael Gove*' of BECTA was considered '*sad*' by one manager, not least because it represented a '*teachers'*

voice' in terms of educational focus.' A similar response to '*retreat'* was expressed by the cut in the poorly named '*schools building programme*, which was '*not about building but about getting local authorities together, whole school teams together [with] background thinking about what we want our schools to be and how we want to get there...Very much about delivering learning.'*

Similar feelings of '*dis-empowerment'* and extreme '*anxiety'* were explained by some staff like Grace[b] responsible for implementing the reformed (from ICT) computing curriculum (2013), since they were not trained in the computer coding required for its successful implementation. A view that state policy was generally damaging in the 2010s was articulated by both the middle and senior managers. However, although premised on the opinion that officials were highly incompetent and policy stemmed from an ignorance of educational issues in schools, resistance was vented, verbally and never actioned. One senior manager, Daniel[b,] in a state school reflects the widespread contempt engendered for government ministers (and the general ignorance accorded to politicians) whilst dutifully compiling and uploading examination data to government departments:

> 'I asked an *education minister* once when he came out with some talk at the Royal Society, with a clearly ludicrous number. I mean I wouldn't *have let my bright GCSE pupils get away with that statement* let alone the A Level ones. Something along the lines of a recent survey by the Employers' Association showed a nine percent drop in employer confidence in mathematical skills. Well, what was your sample? What was your methodology? H ow was it controlled? How was it biased? I mean, but basically I wanted to know what was your margin of error? And when I asked him that, his response was, that it was a percentage. You *know he didn't even know what margin of error* was!'

While Evan[b] observed the constraints increasingly experienced by head teachers in his '*supposedly free Academy'* with '*American-based consortia now directly controlling internal affairs'*, independent school head teachers, did consider that they had greater scope for maneuverability over policy which they deemed harmful to their educational value system. As explained by Janet[a,] a head teacher perceiving Gove's initiatives as a retrogressive step:

> 'I'm just waiting for *Gove* to say everybody has *to use pen and paper* in all the lessons. That's the only thing he hasn't said yet to bring us fully back to the 50s…*I just think the current governmental educational priorities are entirely in the wrong place*…If *I was very unhappy* with the new A Levels I could decide *to do international A Levels,* for example, and keep my *priorities* were they should lie, which is developing the use of *more mobile technology* in the classroom, *not for its own sake* but to

create the *learner* that *we want.* That is a *learner that is independent, collaborative and resilient.'*

Accentuating inequality in provision. External Coalition government austerity policy was viewed as generally detrimental for most internal ICT budgets with schools being '*left to fend for themselves'.* Although one IT manager with experience of both sectors perceived austerity to favour the independent sector, since the once rich academies were losing their subsidies, as confirmed by several staff working in the latter with surprisingly basic equipment. Certainly Janet[a,] as an independent school head teacher (able to accommodate the strategic budgetary requirements of ICT provision) contrasted her situation favourably with that of a state school of which she was also a governor:

> 'We have a *rolling programme,* so we have just overhauled our hardware
> last summer, so we *plan* for it *every 5 years.* I know the school where I
> am a *governor* with the changes to...funding that are coming through. And
> the changes to *capital funding, for wear and tear of* schools have come
> down very significantly. I don't see how they are even *remotely close to*
> *deploying* all the *technology endemic in the last five* years and yet it's
> something for their bottom end, particularly that could be incredibly
> useful. But you do need an iPad for them to run and things *are more*
> *expensive,* so I can just see that a lot *of state schools would really struggle*
> *to fund* this because a lot of *state schools' money* is going to other places.'

Although generalisation is naturally incongruous to qualitative research, caution should be emphasized when analysing UK secondary school provision which is far more disparate (within and between sectors) than one is encouraged to believe. As Owen[b] in an independent school warns; '*Our resourcing is as good*

as or better than average and far better than average in a state school. It's not

always the case in independent schools. A colleague just revisited us yesterday

whose has been away to another independent school and the resourcing and

support are a fraction of what they are here'.

For many institutions suffering from austerity led cuts in funding, (particularly colleges) an encouraging factor was the continued fall in the cost of computer equipment, with most institutions having a 5 year replacement system in place which meant commercial and business developments were of greater significant.

Continuing Professional Development & inadequate training. The pattern of '*poor'* quality training support which accompanied earlier technology introduction, leading to relegation of equipment, staff disappointment and a crucial failure to break down barriers (positioning educational technology exclusively as the field of experts, rather than inclusively, with skills accessible

by all) was to be a continuing feature of life for many mangers throughout the later 2000s, reinforcing negative attitudes in consequence.   Some participants continued to perceive training in problematic terms in 2015. Several managers cited experience of organisations which due to austerity-led funding cuts had reduced CPD budgets by necessity and confined training to (ineffective but cheap) in-house provision, twilight sessions or simply delegated the responsibility to staff via an ideology of self-reliance. Graham[b] pragmatically explained how in 2015 because his school '*hasn't got enough money to send me out on training*' he pays for his own annual training via membership of a professional organisation which keeps him up to date with technology. The refusal to fund external training or to allocate non-contact time within the normal working day for such activity was often rationalised, however, as unnecessary as Hilary[c] explains:

> '*We get no ICT training. We get maybe one or two a year of INSET days or INSET afternoons. This particular school does not like to…pay for offsite professional development for lots of people. As a pastoral leader I've never had an offsite day for anything because they say, we can train you here. Where I personally feel at least one or two days out of school in a new environment with a different perspective is a really good thing.*'

The inadequate provision of resource allocation for training and the cost-cutting practices engendered were recognised by most middle and senior mangers as affecting their staff detrimentally; absorbing precious personal time and energy commitments which they felt powerless to ameliorate due to what they perceived as external factors over which they had no control. Ian[c] appreciated that their overworked staff have become quite '*sceptical because it's their time, their energy, their effort and they're fully booked at the moment*'. A view of exhaustion similarly confirmed by Michael[b], a head of mathematics; '*Under past and present conditions staff are often starting from a position of exhaustion, after a full day's teaching, often linked to excessive administrative tasks*'. Indeed an overall perception summarized by one senior manager, Justin[a,] was that '*a lot of teaching staff*' react with '*suspicion*' to training; '*they perceive it as a hindrance rather than a help*' because '*they think its going to take up more of their time' and not save them time.*' The investment in time and effort to learn about new equipment was recognized by heads of IT who were also teachers. As Steve[a] an IT manager observed of the time outlay necessary to become proficient with a new technology ('WordPress Plugin') to be used with his computer science students: '*If I think about the amount of time I put into that, the average teacher at*

the school is not going to do that, there's no doubt about it'. The solution for Daniel[b] was to conduct a careful cost benefit analysis before purchasing any new equipment:

> 'When I'm trying to evaluate a new resource the first thing I ask myself, irrespective of the cost, is can my teachers use this in a classroom within *an hour of* taking it out of the box? If it's more than that, how am I going to *fund, create or schedule the time for them to learn* this? And if I am going to...*invest two days* of them learning this thing, is that investment going to be paid back in *learning gains* that will suddenly mean they are going to be able to *plan their lesson much more efficiently* and it will save huge amounts of time later or lead to much *happier, less stressful lives*? If they can't…it's just going to sit in the server and be one of those things we show off on end of year. Look at this wonderful new piece of software, its fantastic *but nobody actually* uses it because it takes you *3 hours* to *learn* how to use it, then an hour and a half to *prepare* the resources for one A Level lesson. Then you use it for *20 minutes* of that lesson. Then you think right, *three and a half hours for that and twenty minutes back*. How does that work out?'

Some interviewees, often ex head teachers, who had transfered from school management to IT consultancy, or younger, fast track, senior managers with high level ICT qualifications offered additional insights into the problems of training, highlighting the internal weakness of the office-based senior management team itself.   ICT literate heads and senior managers were surprisingly rare (a view confirmed by most middle managers) with the majority having limited experience of technology. A development particularly, criticised was the overburdening of staff with unwarranted administrative tasks, which the former attributed to a serious, fundamental lack of understanding and engagement with new technology themselves.   A common criticism articulated by Justin[a] was the SMT's inability to *'grasp the fact that a constantly changing ICT environment'* required on-going continuing professional development (CPD) provision:

> 'The trouble is a lot of teachers are spending their time *doing administrative duties not developing their IT skills* elsewhere. The *danger* is you've got a *knackered* member of staff whose *taught* all day and they are going to do another 2 hours in the afternoon. Boosting with *training sessions throughout* the year and then you might start to see change, but [SMT] just don't understand what is required and of course their use of IT can be very limited. The director of studies at another very famous school said I find IT *boring*, so if I go to a training center I *will be asleep* and this is the *director of studies*! You know deputy head academic whose suppose to be the *role model for their staff*.'

All mangers recognised the crucial role, for '*good or ill*', played by the ICT or e-learning co-ordinator in terms of proficiency and personal accessibility. Janet[a], head teacher cited employing a (highly paid) very good head of ICT, '*whom I know I can trust completely [who] knows his stuff and he will also ask the right questions of all these providers and suppliers*' as essential. The key to success Steve[a], in an independent school observed, (describing an inherited situation of '*chaos*' which he successfully redeveloped) was to work closely with staff and to continually monitor, and communicate. As he elaborates:

> 'When I came here everything was falling apart and people assumed that *nothing was going to work*. It was so bad it wasn't difficult to turn it around. There was no help desk the *technician* had everything in his head, so if somebody rang up and there was an issue, he'd just try and remember it. It was just ridiculous and because of that *people just assumed things weren't going to work* and they *didn't use anything*. We have turned that around we've got more people, we've got *more technicians for such a small site and we can respond very quickly and we got good methods of communication*. Teachers can get in touch with us in a number of ways. Even I notice it. If you're stuck there with a class and something goes wrong you've got to get instant help or you've lost the whole lesson and if you lose the lesson well you're not going to do that again. Well you think am I going to get into that class set of laptops if it takes me 30 minutes to log onto them and then I've got 10 minutes left and then that's the end of the lesson.'

Whilst some mangers like Owen[b] have described the problems of importing '*outsiders*' from industry (often recruited at 50 or 55 years of age, looking for '*a nice cushy retirement*') as IT directors, all have agreed on their crucial role in achieving ICT success, via their (in)ability to empathise with staff and to develop or design localised systems, (suitable to unique schools) and based on their personalized teaching knowledge and experience. A view manifest in Steve[a]'s understanding of his staff's onerous report writing task:

> 'Report writing has been online since 2007 and we've just tweaked the system over the years, just on the *feedback from staff*, so they've ended up with a system which couldn't be *better*. It's *hand-written for them*, we've got a developer in house and staff do appreciate that. When it comes to report writing, *it is such a terrible thing to have to do* and *some members of staff have to write 200 report*s. I mean *it's ridiculous* the amount of time they have to spend on it and we've done everything we can to give them a system which we can access from anywhere *that can help them*.'

However, while training for many staff was a major cause of concern, issues of infrastructure and the quality of, and support for, educational technology

was equally crucial and increasingly dependent on developments within the wider business and economic context.

Influence of Business and commerce

Several academics have long argued that private commercial interests have significantly 'shaped' the computer in education from its outset in the 1970s (Selwyn 2011b; Apple 1979; Noble 1997).   Firstly, as seen in the Thatcher era by providing the physical artifacts of educational technology via British industry. And secondly by aligning the 'organisational and pedagogical practices of schools with the needs and interests of commerce and industry (Bowles & Gintis 1976; Dale 1989; Esland 1991; Shilling 1989; Kenway 1996; Schiller 1995), re-focusing educational objectives away from those articulated by traditional stakeholders, such as the teaching professions and government to those of industry and commerce, with a vocational priority on future employability through 'computer literacy' programmes (Saunders 1992; Taylor 1998).   Much of the welfare development in New Labour's administrations (1997-2007), including public-private policy formulation, (ostensibly presented by Gidden's 'Third Way' (1998) as a social justice antidote to excessive neoliberal free-marketisation criticisms of the 1980s) was perceived as pure privatisation (Ball 2007; Dale 2009); an acceleration of commercial influence using 'information superhighways' and Internet infrastructures (in NGFL) to support capitalism's global economic markets via dual government telecommunications industry financing. The whole culminating in a situation, Selwyn suggests, where any contemporary understanding of education as a primarily state driven activity, needs to be replaced (due to the weakened state's inability to change the public sector) by one which acknowledges 'the grip of market forces' and the recognition that they alone have the 'technical capacity or technological expertise to produce most of the technologies that underpin the digital age' (Selwyn, 2011b: 68). As Meyer and Rowan (2006) expound; schools are 'no longer shielded from the pressures of accountability, and efficiency...and have been invaded by providers'.

Value conflict. This empirical evidence confirms that the new environment into which non-state, private interests has been introduced, has significantly influenced the shaping of school technology as perceived by elements of the profession. One major component emerging from the

interviewees is expressed as value conflict. A self-awareness of a distinctive conflict between the values of public good and those of private interest; manifestations identified by some academics in the 1990s. Sussman (1997) for example, warned how the commercial interests, central to the information revolution would invariably place education precariously at the mercy of economic concerns and profit margins as illustrated by the loss of national information network's (Internet) original, much prized 'free' space under the re-territorialisation of commercial business enterprise. Bennett (1995) also emphasised the fundamental lack of understanding that private actors have of the non-commercial nature of the markets with which they are dealing. As Bennett and Tasker & Packham (1993) warned, the worlds of business and education are profoundly different; with profit generation the purpose of the former, unconcerned with concepts of public good and societal benefits. Several managers at both senior and middle management levels identified pragmatically, yet regrettably, what Edward$_e$ described as the development of a '*climate*' in schools which '*extolled the virtues of competition* (individual and organizational) *for private gain*', above more traditional values of sharing and co-operation. However, they perceived no future in which a political agenda or individual agency might control or regulate the external 'forces of economic globalisation'.

Industry market discourse development. A second finding relates to the more practical manifestations of commercially provided technology. For several managers the disparate, un-regulated, competitive and business orientated hardware often functioned inadequately in an educational environment. This problem is unsurprising considering that much IT equipment of the early 1980s was not purposely designed for education, but intended for industry. As this research reveals it was consequently the preserve of the specialist 'hobbyist'; the interested and determined teacher who built up networks from scratch, utilising equipment from a range of suppliers, as Graham$_b$ proudly recalls of the time:

> 'Everything had to *be created*. If you wanted to have a network you had to do *all the software…all the hardware yourself…building* things, working it out correctly. If you needed a printer to go from all of your machines you had to set it up so it gave you chains all the way down to the *printer*. I remember teaching assembly language. There was *software out there that was pretty mediocre*...I finished up *writing* an assembly in Basic (with 8 basic commands in it) to translate the instructions.'

This study, hence, lends support to Haddon's (1988) original conception, of the computer as a powerful and flexible learning machine which was

deliberately developed by an industry marketing discourse in the UK throughout the 1980s. This analysis (1988) argued that despite the presence of large well-established firms such as IBM and ICL, whose focus was geared to business and research interests, the computer had no discernable or tangible use outside the office in the general public's perception at this time. Early micros such as Apple and Sinclair were targeted at the 'hobbyist' market, 'never intended to be more than an educational aid...for learning about the way microcomputers worked' (Adamson & Kennedy 1989: 76) as several IT departmental heads confirmed. Early computers were simply unobtainable to '*buy*' for schools, as Chris_b recalls; '*there was no money available*' and so '*cast offs*' were obtained by '*begging, steeling and borrowing*' from industry, and you '*worked with the particular machine you were given*'; the advantage being that the accompanying level of technical support was excellent in comparison with later supposedly 'educational'-focused companies. Graham_b recounts the extent to which good fortune, as exemplified in Ball's (2007) American-style corporate philanthropy and Noble's (2002) testing (dumping) ground (offsetting losses and tax) for second rate technology, was responsible for the early shaping and supply of educational technology in schools, rather than any central, equitable or strategic planning:

> 'We were *lucky* because I was then in Essex in the 80s and we had what is now Mastercard (used to be Access). They have two bases, one on Canvey Island and one at Chelmsford and if they changed one of the bases they changed the other. So there were *hundred*s of computers. They came into schools. They were *actually offered to schools for free.* And 'Unisys' [IT company] offered 5 [computers] to the school for free. They never went in to commercial practice. They were actually done for the Bank of Ireland and they never went in to the Bank of Ireland. It was a *test group* and they offered these back to schools. So basically in those days, *you were getting what you were given and you were really glad* of what you were given.'

This limited and non-educational purpose of early technology was further highlighted by its insufficiently robust design which necessitated considerable *adaptation* by a minority of technically minded, motivated staff, if it was to function in a school environment (prior to BBC micro production). As Graham_b explained when compelled to merge two computers together:

> 'We used to get Apple machines until somebody pointed out if you open the top of the Apple machine you *broke all the motherboards* off. So we then went for ITT [US company, 1982] which was the English side of the Apple computers. Took the *Apple*s out, which were better machines than

the English European counterpart, put them into the *ITT boxes* and used those. Those were our *early machines*. We did use *tape to tape* and then send it though via a coupler, but the actual computers were ITT and then we moved on to the BBC micro, and Commodore Pet.'

Several managers, while acknowledging both the significance and political dimensions of Blair's 1997 NGFL reforms (widely deemed the key educational technology driver in schools by participants), considered its realization to be actualised, predominantly by economic factors. The incentivisation for business, by the replacement of targeted support for British ICT equipment with the flexibility of purchase from 1997 (utilising the generously provisioned NOF school's technology funding) was articulated by Philip$_e$, with experience of working in several governmental quangos at the time. Views which some academics (Selwyn, 2011b) suggest reveal (through a new accommodation with the globalised economy and the blending of public-private interests) the continued neo-liberal agenda which underpinned so much school technology development during the Blair administrations. As the former explained:

> 'The *market had changed'*. *Government knew* that they could *not just support one platform* and with the *world wide web and the Internet* the *delivery of resources had changed*, beyond buying a simple CD or bit of software' or saying *you had to buy a specific printer, or modem*. Government…actually saying well ok we're going *to give schools money and schools* can do whatever *they like with it, but they've go to spend it on technology*, so there were these *ring-fenced grants that schools* would have, ...part of their *devolved budget*. This is your technology budget, …and of *course that sharpened the minds of the technology companies. So how* can we get our hands on this? They had to *provide the schools that service.*'

The result, identified by several participants, was that companies, led by 'Research Machines', broadened their remit, and deliberately targeted schools as (albeit minor) potentially lucrative markets, utilising advertising designed to offer a '*package*' of multiple ICT resources (hardware, software and technical support) with 'much more of a movement towards schools being:

> ' …p*ersuaded to buy a package* i.e. not just go to a corner shop and buy a computer …but you're actually going and buying a package which includes a *computer, software and the training* and I mean *Research Machine*s were very, very, good at that. They would sell you the *kit* but as part of that deal they would tell you which *software would be best in your various subjects* and stuff and provide you with someone *to train* you how to us it. So those industries which focused on education actually knew that. They weren't just selling you a piece of kit they were actually selling you the whole *service.*'

The increased availability of technology by for-profit commercial organisations, with the state re-positioned as guarantor (reflecting the neoliberal privatisation of education thesis) was emphasised by several managers. While the range of provision, from actual products, (computers, cabling, peripherals) to services and support (maintenance, training, technical) and the involvement of the larger technology ('big business') companies such as Dell and Microsoft was widely cited.   Several mangers had experience, for example, of the multiple (and separately purchasable) modules of provision offered by Research Machines, which included not only teaching and learning but also management information systems, payroll systems, security monitoring and surveillance technologies, external broadband provision, internal networking (intranet), appraisal software and whole school ICT technical support.   As Dale (2009) observes, however, while the private sector, through advertising, its annual fairs (e.g BETT) and the schools' improvement industry (constantly offering new digital products) continues to absorb more of the organizational budget, the overall design of technology hardware and software remains dependent on commercial interests and is shaped and designed for those purposes.

Market constraint and inefficiency. For several managers, these developments, despite the increased funding generated, were viewed problematically.   Some described the period as instigating an era of constraint rather than creativity; associating the development of monopolistic business practices with companies such as Microsoft and a narrowing of educational focus to one which dictated the teaching of ICT office-based skills. Views which validate some academic critique (Fuller 2003; Guernsey 2001; Oudshoorn et al. 2004; Grint & Woolgar 1997) of the minimal educational perspective involved in the whole design process of educational technology. 'Office' applications (e.g. Word and PowerPoint) being particularly interpreted as configured to promote simple, one-way information giving functions (so valued by business for clarity and efficiency) while reducing creative scholarship to trivialized, client pitch formulation (Tutfte, 2003). Charles$_b$ verified that the freedom he experienced between 1990-95; '*an experimental era, with laser discs, PRESTEL and a lot of good work being done*' was replaced by '*the monolith' or 'static period from 1995-2010*' because it was dominated by Microsoft. Several managers were equally critical of the way they perceived some big business to be continually

shaping and manipulating the educational agenda; supporting Oudshoorn & Pinch's (2003) assessment of schools' technology as non neutral. Evidence of the social and highly contested nature of technology practices, with different actors (designers, producers, policy makers, vendors, users) creating different meanings for technologies is reflected by Aaron[b]'s interpretation of early developments:

> 'I think its down to the *putsch from Microsoft*. It was *Bill Gates* going to see T*ony Blair*. He had a major influence. His influence was huge in the fact that he pushed everybody down a *Microsoft Office curriculum*. It was very noticeable that after that visit *all the money* being spent on schools was generally spent on developing the *pupils' skills* which was becoming *office driven* because they were trying to *produce people who could work in an office* and to me that *was very limiting* and for about *15 years* we went though a period of becoming' Officefied'. I call it like *ossifie*d. And it was *boring*. Then the courses appeared, like the *OCR Nationals* and the *GCSE courses* which focused mostly on can you *do Excel*? Can you do *Word?* Can you do PowerPoint? So the IT has gone from a period of *being very creative* to, then *monolithic* for about 15 years.'

An additional problem of the dependency of schools on multi-national and local ICT companies for their computer hardware, software, connectivity and content, has been their inability to redress the inadequacies of much private provision. Despite the rhetoric of neo-liberal apologists concerning the natural efficiency and superiority of market forces over public, several managers found private technology suppliers to be consistently both unreliable and lacking in the accountability structures guaranteed under previous state provision. Surprisingly, infrastructure problems still remained as with Ella[b] a serious '*source of frustration'* for many interviewees in 2015, reflecting Noble's claim that with respect to this area of educational technology 'Big Business has never really known what it was doing [and] failed wildly trying to make the killing' (Noble 2002: 132). The endemic '*unreliability*' of technology was often expressed in terms of normalised practice, as in the resigned commentary of Victoria[b] ; '*so often a lot of things seem to be quite time consuming; waiting for a computer to start up and having just your general everyday issues.*' Indeed inefficient performance was often accentuated in some state schools by virtue of government directed ICT contracts being '*put out to tender'*. Some departmental heads, for example, cited like Liam[b] a worsening of provision under '*private sector bidding for the local supply of infrastructure and supporting services*'. Several respondents interviewed within the same organisation confirmed that the ICT service had become '*more ineffective'* due to funding-linked enforced changes of

contract (for a prescribed number of years), consequential to a move from in-house provision to '*outsourcing*' as articulated by Robert[a]:

> 'I think the technology is largely a *source of frustrati*on because we've gone from everything being *in house* to *outsourcing*. So we have a *managed server*. So if we have an issue we've gone from *just being able to call up the ICT technician* to *formally logging a call*, either by *email or calling someone else external* to speak to. I don't know where they're based. You get *a job reference number* and then that is sent to the technician in the school. So in terms of *effectiveness* we have a lot of frustration.'

Several middle mangers also identified the constant requirement by companies to update equipment and software to be a serious problem, since for Susanne[d] any '*consolidation*' of, and '*familiarity*' with, ICT systems is '*never achieved'*, before new time- consuming training occurs in a cyclical process. The role reversal in the human-technology dynamic, from a supportive to a problematic one, with external companies dictating unwanted change and technologies enforcing human adaptation, was articulated by several interviewees. The loss of personal autonomy and the subsuming of normal rational evaluative processes within a prevailing ideology of modernity is exemplified by Roberta[c] who outlines a series of innovations, as rhetorically beneficent but clearly retrogressive in practice:

> 'The more the school wants to be *progressive*… the more *new obstacles* we face. This is the first year our email has been a Gmail based email, as opposed to Outlook email and that in itself has posed lots of *challenges*; every machine has to have Google chrome in order for Gmail *to work properly* and its been a *huge year* in terms of *changing how we do things*. We've gone from everything based on our T drive, which is our central shared area to *making new documents* [and]… it makes me think oh, what about the warnings we were being given or the advice about sensitive information being opened on computers at home because all of this stuff is readily accessible anywhere and there *hasn't been much guidance* about that. The whole *networking of stuff has really changed, like the way we print* has changed massively. We used to have a printer in most rooms very close to your computer, we now send print jobs to one of maybe 4 or 5 printer photocopier printers in the school, so that's changed.'

Although, ostensibly, the provision of ICT services appears lucrative for business, with companies such as 'Blackboard', (a popular virtual learning environment) advertising worldwide multi million dollar turnovers and interactive whiteboards companies (BoardWorks, SMART, Promethean) dominating most UK schools, some academics advocate caution. Bromley (2001) warns that for large multinationals, educational contracts (still perceived as historical slow to change institutions) do not generate 'super profits' (Dean 202: 3). The main

commercial benefits are to be gained by 'brand awareness' and the access to future, potentially loyal consumers, via the captive cluster of parents and households which the school environment provides (Selwyn, 2011b) and a business-dominated media supports.

The influence of Media

The role that print and broadcast media have played in consolidating the myth of educational computing within British culture has been widely acknowledged by some academics. Barthes (1973: 143) conceptualisation of myth stress that 'a myth does not deny things...its function is to talk about them; simply, it purifies them...makes them innocent...gives them a clarity which is not that of explanation, but that of *statement of fact*.'   The media as Berdayes and Berdayes (1998) argue, after portraying computers in a rather vague fashion throughout the 1950s and 1960s, as 'awesome thinking machines' (Martin 1993) have continued to promote technology positively and uncritically; as the instrument of rational progress with, crucially, the capacity to educate. Sparce publishing space has been granted to the social consequences and problems inherent in any technological development, as mirrored in omission of such content in national examination syllabi and in this study's research.

Since Time Magazine's prestigious 'Man of the Year' award to the computer in 1982, the UK British Broadcasting Corporation's (BBC) formative television programmes from 1978 (*The Might Micro*, *Goodbye Guttenberg*, *the Silicon Factor*,) and the state endorsement of the BBC micro computer for the school market in the 1980s (an ostensibly neutral and educationally trusted information source), the media has endorsed technology within school culture, often preferencing sound bites over informed policy debate, in what Hattam et al. (2009) have described as the 'mediatisation of educational policy'. The latter discourse encapsulating the expression of governmental agenda through selected media; shaping public opinion and managing professional expectations of schools technology in a manner which has influenced the two main stakeholders of the public arena; parents and the teaching profession itself.

Beneficent modernity culture discourse and teachers. Utilising the regular educational technology supplements published in UK newspapers which target teachers, such as the widely read 'Times Educational Supplement', from the 1980s to 2000s (online presence from 2010s), the media has positioned computer literacy (computer programming, 2015) McNeil (1991) argues as the antidote to economic decline. Moreover, it has portrayed continual technological change (equated with beneficent progress) as the moral duty of educationalists to the new generations of citizens, while presenting continuity as reactionary. Several heads of department, as evidenced throughout this research, have clearly, yet unwittingly, internalised such deterministic perspectives when articulating their need to '*keep up*' with modernity and '*to equip students for the economic world*,' irrespective of personal and professional reservations. Little challenge was offered to a social reality based, as McNeil observes, on 'unnoticed positive narratives' about how new technologies were expected to transform and unify the world (McNeil 1991: 109), with some managers embracing normative categorisation through the self-employed use of stereotypical language when attributing perceived technical limitations to personal 'Luddism'. Even the vested interests of actors such as businesses who stood most to benefit from the promotion of continual, disruptive change and updating (Lyon, 1988) were described (as with one of head of politics cited) in a resignation and acceptance which obscured their exploitative purpose. This resignation of managers and the normalization, as factual (Barthe's thesis), to the negative pace of un-relentless change, was a feature of several interviews, in which technological machines were equated with an almost deterministic quality and over which staff had little control. A finding which lends support to Lemke's (1995: 58) theory concerning the power of political technocratic strategy to present policy as if it were (similarly) dictated by matters of fact and one which deflects the normal considerations of social, moral, political choices and responsibilities, equated with a profession as value oriented as teaching.

That few managers were able to recall any empirical evidence based on a link between educational attainment and ICT being offered in justification for the introduction of educational technology in their schools is significant (as previously emphasised). The impetus attributed by Roberta$_c$'s head teacher was; '*the idea to keep up with trends*', with an unperturbed assumption of the existence of; '*I guess, some proof for my school to invest*.' The perception of a need to

'*keep up with the times*' and that change is progressive and improving, was articulated in language which emphasized the delivery of ICT in terms of '*exciting*' and '*dynamic*' lessons.   Mantras such as '*shift happens*', explained by reference to the organisation's newly acquired '*ethos*'; and as Jane elaborates '*there's lots of change and we need to be part of that*', were developed and particularly targeted at younger, more malleable staff who were equally encouraged to see themselves as modernists, overcoming the resistance (of older staff) to inevitable change, via in-service training as articulated by Abigail$_c$, a head of geography:

> 'It's just this idea that *there is change* and its about *accepting* it and *going with it* rather than trying to *resist it*…because…the average age of staff was definitely higher. We had a very experienced staff, so she [Head] was probably anticipating some resistance.'

Consequences of flawed discourse. The internal tensions between senior and middle managers as evidenced throughout this research supports an interpretation (Bromley 1997) which highlights the fundamental problem of demanding genuine results from flawed policy, founded on the media's presentation of educational technology as distinct from society in either its cause or effect.   Whilst ignoring on the one hand, (intentionally or otherwise) the agency of schools, teachers and middle managers upon whom the policy is wholly dependent to succeed, it continues on the other hand to place political pressure (via Ofsted and League tables) on visible success, culminating 'in an imperative for educators, in their representation as head teachers and SMT to make the myth of educational technology real' (Selwyn, 2002: 37). This need for continual change and forward momentum, long promoted by senior management (ironically and widely perceived as ICT illiterate) is now being increasingly challenged by middle managers who are seeing the consequences of policies translated into a serious '*inability to retain and recruit new staff*' from the UK as Justin$_a$, a newly appointed young senior manager explained when regularly employing video link technology to interview potential newly qualified teachers in Australia.

Beneficent modernity culture discourse and parents. A cursory review of the established printed media of the time, Selwyn (2002) argues, supports the interpretation that newspapers reinforced the prevailing political and commercial discourse of computers as powerful, desirable educational devices, (learning through play) to the idea of computer as benevolent tutor (contrasting with incompetent teacher) in order to deliberately engender parental support. Using

language which presented a highly positivistic, often futuristic, view of technology-based learning, he suggests, journalists targeted the young and their parents with positive narratives of children being taught, not only to exceptional levels of expertise by digital technologies, but also created an image of children's natural affinity (and ability) with technology as previously discussed in the development of the digital native discourse. The consequence of the emergence of parental interest in educational technology for middle managers' labour was considered formative by all participants.

The influence of parental stakeholders

While the empirical data confirms views regarding the highly significant, yet often underrated role of parents, in the shaping of educational technology in schools, this evidence reveals a more complex relationship between technology, parents and staff, with more detrimental consequences for the latter's professional life.

Support for educational technology development. While previous research has equated parental expectations with the positive promotion of educational technological, as one of the key vested interest groups (2007) in Buckingham's 'educational-technology complex'; (journalists, commercial interests, educational researchers etc.), guardians are often perceived as promoting a pro-technology agenda (Selwyn 2010) as high level 'consumers' of technology themselves (with smart phones, internet, digital technology integrated into their working and daily life styles) and recipients of earlier computer-based schooling (1980s and 1990s) and its beneficent educational technology discourse. The latter reformulation, he argues, of the personal computer (entertainment device) into an educational one (initiated and consolidated under Thatcher and fully 'mythologised' into British culture by the Blair administrations) has fostered parental expectations which compel schools to boast 'the latest technology equipment as a symbol of its high quality teaching and learning' (Selwyn, 2011: 83).

While empirical data did reflect the latter interpretation to some extent, with Isabella$_b$, an experienced manager articulating how parental expectations have changed over time; '*when I arrived at this school ten years ago there were no interactive whiteboards. Now it is assumed that every classroom must have*

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one or it's not a proper classroom' and Janet[a], another head teacher describing her parents as technologically '*quite clued up'*.   Both views, however were further qualified. The former highlighting the development of a '*slightly more grown up'* attitude by 2015 and the latter acknowledging '*sadly'* that IT supporting parents are '*not the majority'*, with many exhibiting hostility to the point of 'paranoia' at the employment of '*evil'* new technologies, equated to social media in her school. Consequently, while 'educational technology' may play a '*big role'* in parental concerns, it is not necessarily a positively given one; the 'reality' being more complex than previous generalization (pertaining to earlier eras) might imply. Abigail[c], an e-learning co-ordinator noted that several parents vocalised in school forums a attitude which;

> '…can be quite *negative* and I can see their point. As a parent you think, you see your child on a *device,* you *don't know what they're* doing. We encourage them to be on a *screen all day long* that's their *perception* and when they get *home* too.'

Communication and workload implications. Most of the managers articulated the view, however, that parental pressure was highly significant but manifest more in issues of examination success, concurring with Buckingham's assessment (2007) that the expansion of national testing and the increasingly competitive educational climate (amongst schools, parents and children) had fuelled an atmosphere of heightened anxiety and guilt amongst parents, concerned about their child's ability to pass tests and gain university entrance, at a time of changing social structures and working patterns. Whilst unions and cultural expectations had once mitigated the worst excesses of parental demands, the decline of infrastructures protecting staff welfare, coupled with ICT facilitation of an unregulated access, has impacted negatively on many staff interviewed through increased (parental and child instigated) work load. '*Transformative'* developments in digital communications, encouraged by SMT, via portals ('*the usual clarion call that most schools use to communicate with parents'*) have enabled the government's twin goals of neo liberal accountability via customer choice and child study ethic (location independent) to be realised, with staff in most schools expected to be available, off site to students and answerable to their parents, directly and speedily via email.

As Ella[b] observes, the changes in the professional's role due to the individual's (as opposed to the organisation's) direct accountability to parents (who grant considerable digital freedom to their offspring) has increased both

workload and stress levels considerably. Moreover, it has occurred in an incremental, almost invisible manner, with unforeseen, yet detrimental consequences, which (although vocalised) remain largely unaddressed by unions and organisations:

> 'I *think technology*, side by side with *liberal parenting*, has produced students that *expect a lot from their teachers*. And the *instant communication* means in effect you're *always contactable*. So teaching A level subjects, I'll often have emails from my students asking questions about particular pieces of work, asking me advice, sending me practice questions into the lead up to exams and I think the students *need to take more responsibility*. And it can be quite easy for them to shoot off an email asking questions, rather than taking the time to come and find me during the day...But I do remember ...when email was growing at sort of 2003-5, the school pretty much established a *policy* that we would respond to *an email within 24 hours*. Its not uncommon for *parents to send you an* email and then maybe call an hour or two later expecting a response, not realizing you might have a really full teaching day. So I think the *expectations from parents and students* have grown with that kind of *instant communication*. And likewise the type of communication that comes with that. I mean I'm sure that we would have had our fair share of *irate or angry parents* over the phone but that too comes through email as well.'

Technology has also been perceived to broadened the remit of the school's social responsibility for the welfare of its students, as one pastoral head explains, by creating additional challenges and new roles with respect to parental expectations of behavioral management control, off-site of school premises, due to the increasingly dysfunctional use of social media as Roberta_c explains:

> 'I think the *realms of the responsibility* of the school have grown and with that the expectations of students have grown in terms of their overall wellbeing. It's also brought up issues to do with how students relate to each other, *cyber bullying* and not being very nice to each other on email. In my year group, in Year 13 this year we've had a lot of boys who enjoy joking around and there have been like whole group emails and responses and students who have been *quite upset* and having to speak to those students about our ICT policy and reinforcing that. So it's presented *challenges to do with behaviour*, particularly in the lower school, with the *social media aspects*. But then there's also this line of ok then what's posted on a public forum outside school time, then is the *responsibility of the school for them to investig*ate, chase up because it can impact on what's happening in school. So that's probably added to the *workload in a way*. Not to say that wouldn't happen without ICT but that's certainly a *huge part of our behavior management and the pupil achievement* team who, just coming up with all of these policies and having to respond to changes in ICT use. That's been a challenge for schools.'

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Consequently, while many teachers perceived improved communication with both parents and children to be beneficial, the overwhelming and uncontrolled growth of access has created problems in terms of time management and stress for professionals who are already perceived as time poor and overworked.

Analysis

In summary structural forces have significantly mediated the relationship between departmental heads and educational technology with agency continually adapting to, rather than shaping developments. External governmental influence whilst perceived variously, as aiding or constraining educational technology development, is contrary to theory, internally prioritized and actioned. Centralist, interventionist directives, enforced via external agencies are interpreted as detrimental change contributing to inefficient standardization and recruitment problems. Some unforeseen consequences of legislation are credited with accentuating internal divisions and hampering the emergence of a professionally trained, critically, ICT-literate, teaching and managerial staff. Commercial forces are often viewed as deflecting energy and efficiency by embedding physical structures and ideologically-based processes and procedures which are functionally inappropriate for educational purposes and alien to its traditional value system, yet supported by a media discourse which is sufficiently internalised by staff and parents to sustain the exponentially expanding work remit.

Chapter 7

Conclusion

Introduction

My thesis has sought to contribute to a better understanding of the human relationship with educational technology; the dynamics of which continue to remain controversial after three decades of research. Educational technology is of course a vast remit for the single researcher to investigate. Whilst of practical necessity I have focused on a singular aspect (middle mangers in UK secondary schools), my approach which contextualizes usage, while not intentionally generalisable, renders, I believe, its conclusions valuable and its insights substantial. I have endeavored to redress limitations in previous research (as outlined in Chapter 1) which I considered to be overly technologically deterministic, student-learning theory orientated and 'micro-focused' (Kenway 1996), by employing a 'social shaping' perspective which incorporates educational technology within the wider political, economic and social dimensions which shape it. For it is by thinking about the technical in holistic terms, including the often omitted historical perspective, that the complex interconnections and inter-relationships of the phenomenon can be more clearly identified and thus analysed.

My primary objective has consequently been to investigate, from the more manageable and actionable head of department's core perspective how, and to what extent (continuity being as much a facet of development as change) educational technology has influenced the professional's working life. Thus, the self-professed '*muted voices*' of the micro-level human dimension, is explored within the meso level context of the school organization and the wider macro level socio-economic environment. Moreover, by focusing on the individual's whole career, the dimension of time and the non-static, mutating nature of the relationship with the technical is acknowledged. However, by virtue of the organic nature of the research process, I have broadened my remit to posit a contribution to an understanding of more fundamental questions; suggesting that insight into the human-technology shaping dynamic will also help us to answer more fundamental questions of social theory, concerning the role and interplay between human agency and structure, and the micro and macro relationship.

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Both goals have been realised in my research design by employing a conceptualization of the social world which integrates an historical element within a multi-dimensional design, highlighting the interplay of micro, meso and macro level factors.   These theories of interconnectivity and social shaping which operationalized the empirical examination of interaction, also shape the structure of analysis. Consequently, it is within an adaptation of Layder's (1993) four social domains (*self, setting, situated activity, context*) and Kozma's three (micro, meso and macro) levels of educational technology analysis that the empirical findings are now discussed and their original contribution posited. This chapter then proceeds to reflect upon the research process, highlighting its limitations, suggesting recommendations for future investigation and policy, before finally offering concluding remarks.

Review of empirical findings in light of research questions.   The following sections evaluate the extent to which the empirical findings have answered the original five research questions and how the study's general theoretical framework has stood up to the empirical data, referencing salient theories from the literature pertaining to the *social shaping of technology*, the *grammar of schooling* and *managerialism* and key themes emergence from the research pertaining to *continuity and change and creativity and constraint* in the process. Where appropriate I draw attention comparatively to previous research findings in order to highlight what I considered to be its original contributions to knowledge and understanding.

Implications of ICT for head of department's professional work & role.

The first three research questions specifically explored at the micro (or 'self' and 'situated') level of analysis; how ICT had changed the work of the head of department (Question1), how the latter had responded to ICT innovation over time (Question 2) and what physical and human consequences ensued for academic and pastoral departments.   From a social shaping perspective this involved examining the extent to which technology had influenced practices and/or how individuals had shaped, adapted, and ingored technology for their purposes. Since a review of the literature drew attention to academic theory which highlighted the significance of addressing continuity within the evaluation of change (Webster 2006), qualification was incorporated into the focus in order to avoid attributing change unequivocal status.

To answer these questions existing research evidence was examined in Chapter 4, followed by empirical data gathered by semi-structured interviews primarily with heads of department in UK secondary schools, but supplemented by interviews with key experts (e.g. trade union representative, ICT consultant, head teacher and newly qualified teachers) when I considered responses stimulated verification and further exploration of subject matter.

With respect to the three elements of the middle manager's job; teaching, resource and human administration and the management of people, educational technology was not seen to have altered, 'shaped' or 'revolutionised' the (primarily perceived) teaching element in terms of fundamental processes. Although the physical presence of technologies had mutated from black(white)boards, overhead projectors and various reprographics (e.g.'Banda' machines), they were still essentially 'aids' (computers, laptops, iPads, whiteboards), used in the preparation of resources, the teaching of groups of students and (for a minority) the marking of the latter's output, confirming earlier findings by Passey (2004) into English secondary schools. For the majority of interviewees the basic linear processes of education had not been revolutionised, but was perceived in terms of continuity of practice. Thus supporting, to some extent, the conservative aspects of *grammar of schooling* theories of Cuban (1986) and Tyack & Tobin (1994) in the sense that an individual member of staff, still prepared resources, (as opposed to employing Computer Assisted Learning) taught a group of students, usually in a traditional classroom (rather than computer laboratory) situated in a school building and assessed their work.

However, the evidence by no means reflected an inherent conservatism of attitude (as the theory implies) amongst the interviewees themselves and serves to highlight the distinction between individual staff attitudes and those of a conservative institution in which they work; a distinction which is not recognised in Hodas's (1996) analysis of institutional conservatism. Most participants articulated a rationally balanced assessment of technology in teaching, confirming previous international research reviews of staff 'uptake (Olofsson 2011), weighing its engagement and motivational aspects (flexible resource creation, sense of control for teachers) on the one hand with its drawbacks (encouraging mental laziness, disciplinary challenges) on the other. However, what proved particularly illuminating was the genuine recognition of its evident transformative contribution to pedagogy and to the acquisition of higher level cognitive

processes, as illustrated specifically in mathematics and design technology; both subjects which previous research studies (Passey, 2011, 2004) had identified in terms of cognitive potential, but hitherto unrealised. From this pedagogical perspective, therefore, the human-technologically dynamic is seen in a more mutually social shaping capacity (technological potential recognized and applied by human agency) and represents significant discontinuity and 'novelty' from pre-digital formats in contrast to the continuity of its usage as institutional technology (Nordkvelle & Tosterud, 2008). Facilitating further curriculum based, genuine, ICT linked cognitive innovation by specialist subject staff, with the expertise to recognise and develop such potential, I suggest, is currently hampered by lack of time due to displacement, non-productive, administrative and management activities (as previously discussed).

Moreover, this comprehensively evaluative response to technological innovation and the positive attitude towards innovation was far more enthusiastically articulated than previously acknowledged and expressed in language which clearly referenced perceptions of real and valuable change. Whilst Cuban's oft quoted cyclical description of the rise and fall of new technologies in school over time concludes with eventual disappointment with each respective device, it should perhaps be interpreted as equally representative of a staff's continual open-mindedness and receptiveness to the new. The sense of creativity (and ICT use is comparable to other creative processes) is qualified, however, to its deployment within an autonomous environment with human agency predominant and thus, by extension the rejection of any resources and processes than enforce standardisation. The significance of flexibly applied ICT, meeting the varied needs of its heterogeneous staff was highlighted by one departmental head's description of her classroom in terms of a *'sacred space',* simply because of the *'sense of freedom'* it offered. For in stark contrast to the *'formulaic'* use of technology enforced in administrative processes, in the classroom she could employ her professional "*qualified*" status of trust to teach as she wished. Thus revealing the varied and complex nature of the *social shaping of technology* dimension in action, illustrating fluctuating dominance, of agency and structure respectively, at different moments in time.

Moreover, optimistic responses towards technological devices were not age stereotyped, with more mature, self-assured and experienced heads of department perceiving themselves as 'innovators' and 'developers'; leading by

example and encouraging experimentation, contrary to resistance and over-simplified categorisation theories (Bigum 1998). The affinity between youth and ICT was equally shown to be more complex than previously assumed, supporting Jones's (2012) critique of 'the Net generation and digital natives' as based on anecdotal and popular evidence. Attributing whole (young or old) generations with fixed learning characteristics, skills and aptitudes (dictated by external structural factors, but not conditioned by them) denies both widespread empirical evidence to the contrary (see Jones 2012) and exhibits flawed deterministic thinking. Certainly participants in this study were surprised that younger NQTs and staff were less willing to take risks by applying new technologies and were more accommodating of the status quo, supporting evidence that highlights complexity of usage, and often observes differentiation between leisure and academic purpose (Shulmeister 2010; Corin et al. 2010). The opportunity qualitative research provides for accessing interviewee's full explanations confirms theories (Gitlin & Margonis 1995) which identify pragmatism and utility as a key motivational factor for young teachers, supporting Selwyn's (2011b) similar assessment regarding the strategic behavior of students.

The concept of the superiorly ICT skilled digital native was not widely recognized by teachers or experts, in contrast to some assertions and research (Prensky, 2001; Williams, 2008, Crook & Harrison, 2008; Kennedy et al. 2008; Palfrey & Glasser 2008; Tapscott 2009), with most clearly distinguishing between their technical dexterity and higher level cognition. Thus ICT was not attributed to fostering internal departmental divisiveness in this sense by most mangers as I had initially hypothesized. Whilst the image of the reluctant older member of staff to engage with technology was still apparently disseminated by some teacher training institutions, the NQTs and younger heads of department interviewed noted how it evaporated in the light of practical experience. Although a small minority of colleagues were deemed 'anti-technology', the reasoning when fully elicited, was generally related, not to polarised and embedded negative attitudes, but to external factors (poor training or lack of ICT facilities) which were invariably overcome by the human initiative of the ICT directors who initially identified them.

The human relationship with educational technology, in its pedagogical capacity, was perceived by most interviewees in highly *creative*, rather than *constraining* terms, supporting Goodson et al.'s (2001) interpretation and

highlighting the significance of principled pedagogical and judgmental-led deployment as hypothesized. Resource creation, *individualisation* and *adaptation* to unique teaching and learning situations (albeit time consuming) were considered highly satisfying and enjoyable aspects of the job; a traditional facet of the work which ICT had enhanced and which clearly suggested the predominance of agency in the social shaping of technology theory.

However, some ambiguity was, surprisingly, evident. For while the technology integration process involved considerable on-going human adaptation (including selection, rejection and re-shaping exemplified in the restricted deployment of whiteboards and the embracement of iPads) and a social shaping of devices, due to the often inappropriateness (and unworkability) of much (business orientated) design, it was not widely or explicitly recognised in the terms which celebrated human agency. Staff were regularly circumventing any attempts of physical technology to dictate their teaching style. Indeed the forward and futuristic outlook (and here one could argue ideological supplants pragmatic motivation) that governs much of the psychology of both the teacher and the school establishment, served to distort the self-perception of the *natural* process of human adaption of technology into guilt laden *devian*t behaviour. Illustrated in this study by ICT co-ordinators articulating views that colleagues were not employing technology 'correctly' or to its 'full potential'. Hence, while historians of technology (Nye 2007) interpret continual innovation from original invention as a natural process of human engagement, (exemplified by the deflection of the telephone from its intended telegraphy function), any discretionally manipulation of technology by staff from its original (often ineffective) design is widely perceived in terms of non-usage or 'incorrect' deployment. This reflects an external discourse so successfully internalised that managers articulated it through feelings of guilt and self-categorisation as 'Luddites'.

The change in communication patterns directly attributed to technology was considerable, with less face-to-face encounters and fewer departmental meetings as hypothesized. The speed and access offered by email, intranets and internet connectivity was welcomed, however, between busy colleagues, who also creatively *adapted* personalized networks to overcome the demise of previously funded professional development programmes and advisory support groups. However, the one-way channelling and brevity of such communication which minimised egalitarian discourse and two-way conversation, facilitating its use as a

centralised command tool, suggested that technology was being employed by the organization to shape and control human behaviour rather than vice-versa. Mandatory access to the intranet's email, as one of the primary requirements of the day contributed towards additional feelings of constraint and disempowerment.   Moreover, email overload had reached crisis levels for many managers and a significant unforeseen development was articulated as the increased workload generated by un-regulated parental/guardian and student (email-based) access to staff, irrespective of time and place, engendering considerable work-related stress.

        With regard to administrative tasks, ICT was similarly perceived in its acknowledged capacity (Passey 2007) as a positive aid, with organisational, resource preparation, publishing and integrated analytical data management tools cited as invaluable. However, a noticeable, detrimental shift was observed in the proportion of time and energy engendered by new ICT-facilitated tertiary administrative duties. These had grown at an unforeseen and exponential rate, becoming disproportionately unbalanced against other more professional commitments, contradicting interpretations of ICT as labour saving devices (Haigh 2007) and supporting views of task generators (Wacjman 2008, 2015) and unforeseen consequences.   Whilst some tasks such, as mandatory ICT report writing, absorbed inordinate amounts of time, many were considered both low level (equated with non-professional secretarial duties), contributing little of value to the highly skilled business of teaching and learning, from which they significantly detracted. In this respect technology was perceived in a deterministic manner as the driver and shaper of negative change, with individuals at its mercy. Moreover, whilst there was a recognition that the role of head of department was being subsequently demeaned and its status undermined (contributing to feelings of low morale), the causal link to the organizational agency of a senior management team which enforced such change was not always made.

        Detrimental change was also expressed in the managerial responsibilities of the job, traditionally reflecting shared 'emancipatory and humanistic educational ideas (McConnell et al. 2012:15) perceived as high status and personally rewarding, espousing the values of altruism, departmental collegiality, collaboration and cooperation and cemented through academic subject or pastoral care shared interests.   However, several interviewees considered that the

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manifold aspects of team leadership, including the supportive environment in which to train younger staff, had become distorted by the prioritisation of the role's monitoring and surveillance functions, at the expensive of its human welfare responsibilities. Several participants perceived these developments as directly attributable to the quantifiable facilities *enabled* by technology, creating distrust and division within the department and anxiety and internal conflict for the manger. Consequently, two key elements (administration and management) of the head of departments' job had substantially changed, engendering perceptions of constraint, disempowerment and de-professionalism, which being interlinked with organization change is explored in the following section of meso level analysis.

Implications for ICT of organisational structure and managerial interrelationships.

The fourth research question (Chapter 5) queried to what extent educational technology had influenced the immediate organisational structure (constituting physical resources and social relations) in which the professional was employed, specifically how it may have shaped internal managerial relationships and influenced the working conditions of the departmental head in consequence.

In terms of physicality, whilst the basic work processes of the institution were perceived in terms of continuity with the past, the physical environment was considered by most managers to have changed far more than originally hypothesized and as sometimes credited by theories which emphasize the seamless integration and assimilation of new technologies (Bigum and Rowan 2008).   Nor was the extent of physical transformation necessarily standardised throughout the UK, with noticeable differences in provision emphasized by managers with experience of multiple organisations within the public and private sector. Change was, however observed incrementally, (although not in the four stage assimilation process theorised by Mioduser, 2003) with an initial slow period in the 1980s, followed by accelerated development in the late 1990s, to the current situation in which the rapid pace of change was perceived by several departmental heads to have outstripping human abilities to accommodate it. A determinist relationship between materialities and pedagogical change, (previously discussed) as highlighted by Mulcahy's research (2015) was clearly

recognized as such by some managers who resented implications of social engineering, whereby the organizationally imposed removal of 'old' equipment (whiteboards) and replacement with new (interactive whiteboards) was expected to induce new behaviour patterns and teaching styles. Several managers were also concerned that new designs were being increasingly commercially, rather than educationally led, with some favoured devices being updated, relegated or negatively changed, to no real benefit and considerable harm. Evidence which parallels the increasing prioritization of private, for profit, commercialization (exemplified by Pearson's market domination) and the business model of educational provision over public good in universities, under pressure of economic austerity, as outlined in Jones's thesis (2014). Indeed, new technologies do not necessarily equate with 'modern' pedagogy as Jones illustrates via the use of 'classically instructivist…transmission of knowledge' systems to deliver the much heralded internet facilitated massive online open courses (Jones 2014:174).

Moreover, educational technology, however positively received by staff, were not un-problematically integrated into schools, but rather constrained firstly, by the existing physical '*materialialties',* (classroom layout, buildings, routines etc.) as observed by Lawn and Grosvenor (2005) and secondly by the inadequate functionality of equipment and infrastructure. The development of statistical citing of the physical presence of ICT equipment in schools (lauded in governmental reports) is no indicator of effective deployment. Whilst human endeavour and ingenuity by middle managers often overcome the daily obstacles posed by poorly functioning technology, the energy and time expenditure necessary to circumvent 'faulty' technology into the (usually non-robust) existing infrastructure and its associated practices, was both considerable and sufficiently ongoing to have become a new normalized feature of professional labour, confirming trends identified by Watson (2001).

The evidence pertaining to the physical, however, requires further contextualisation within its immediate cultural and social relationship setting in order to fully comprehend the multiple interconnections (to avoid deterministic impressions of the functioning of educational technology) between them. The manner in which physical technology is designed and resources deployed, organised and managed is ultimately the product of the human decision making process. As Jones (2014) observes it is a question of organizational and political

choice. Thus managers' impressions of confronting technology in its more rigid, as opposed to its flexible and creative formats, (the opposite of early designers' intent) is related to developments within the organisational structure which has not remained static, contrary to assumptions which perceived schools as antiquated, conservative institutions.

Several middle managers who embarked on their career in the 1980s observed change rather than continuity to be the defining feature of the institution's orgainisational structure and culture. Amongst the major technology-facilitated structural changes identified was primarily an intensification of hierarchical systems (contrary to the ideals of early internet developers to foster horizontal structures and undermine and flatten out authoritarian ones) as expounded by Hodas (1996) and the practical processes of de-professionalism, based on its inherent conflict with the prevailing neo-liberal ideology as theorised by Olssen (2005). Confirming Foucauldian interpretations of technology's application to regulatory control, mangers often articulated these changes in terms, not only of professionally demeaning staff monitoring and surveillance, but also of the development of excessive (to the point of harmful) bureaucratic control, an increase in low-level administrative tasks and externally imposed and punitively applied targets and performance criteria. The identification of such mandatory, digitally-based administrative tasks and procedures as both externally imposed, increasingly *'valueless'* and detracting from the educational teaching process, supports the theorisation of technology as assimilated or co-opted by the organization for its own purposes, supporting Tyack and Tobin's (1994) interpretation of the goals of political elites and Goodson et al.'s (2002) of the interests of the organisation's senior individual actors. Both evaluations reiterating longer standing accounts of the manner in which educational technologies are as much shaped by the social relations of schooling as they are able to influence the shape of schools (Bromley 1997).

The corollary, as diminution of the superiorly valued independent academic sub-culture and professional workload autonomy was reflected in several manager's complaints regarding the undermining of their traditional more egalitarian and respected contribution in the whole school decision making process, *vis a vis* senior management. Whilst some senior staff recalled a era of more collaborative engagement and explicitly acknowledged the enrolling of

non-location dependent technological devices as a conduit to control staff; confirming Monahan's (2005) theorisation, younger managers' pragmatic and more unquestioning acceptance of hierarchical order, (and many interviewees were reluctant to openly voice criticism) reinforced Perelman's (2014) hypothesis of the normalisation of highly effective internalised, self-controlling, management systems. The latter established via ICT-led standardisation, and centrally, quantitatively recorded supervision processes.

The substitution of a traditional management system based on rules and procedures to one grounded in performance management and measurement, through key indicators (Teelken & Deem 2013:2) clearly aroused tension. The required acquiescence to more centralizing, overt authoritarian control systems, opposed to traditionally collegiate departmental structures, generated for some managers considerable personal internal conflict and anxiety which for some induced early retirement or alternative employment. Moreover, the accentuation of organisational conflict represented by a division (evidenced as clearly conflicting goals) between middle and senior management, beyond what Ball (1987) ascribed as normal, was expressed by several interviewees in feelings of alienation from the latter's values and behaviours. In conjunction with noted departmental tensions and divisions, fostered by (in some participant narratives) the mutually distrustful environment of the 'panoptic' gaze, the prioritisation of the ethos of a standardised corporate identity over traditionally entrenched educational values and the widespread mitigation of genuine staff welfare, had led to a recognised deterioration in the working environment for many managers.

The social shaping of a more subservient culture, with power and dominance in relationships overtly expressed (reinforced by the afore mentioned communications systems) with colleagues and departmental heads expected to be equally docile and compliant, negates, the essential open culture (as evidenced in the 1980s) in which technology can be critically discussed, independently evaluated and thus effectively and flexibly implemented, adapted or discarded. Consequently, the evidence suggests that organisational change has inhibited and constrained many mangers' creative working processes.

The lowering of workforce morale as further evidenced through organisational induced de-professionalism (lack of work autonomy, the demeaning of expert judgement and status) and the enforcement of standardised work practices (deviations from which are easily measurable by technology) has

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contributed to an anti-creative, risk-taking cultural environment, contrary to the one in which educational technology is deemed to flourish and thus ostensibly organisationally irrational. However, as Hodas (1996) theorises organisational purpose is neither necessarily educational nor rational and in order to avoid social determinism, the explanation of organisational behaviour, (which has been tangentially interlinked with neoliberalism in Chapter 5) as interpreted in the actions and beliefs of the individuals who determine it, requires contextualized within the broad macro level analysis which follows.

Implications for head of department's effective ICT implementation of the socio-economic and political environment/context

Empirical evidence pertaining to my final research question located the discussion within a macro level analysis (Chapter 6), organised at the *context* domain in Layder's (1993) conceptualization of the social world. It is, consequently, by means of this overall holistic perception of the research phenomenon that I propose my investigation may also contribute to social theory and an understanding of the broader structure-agency/micro-macro dualism debate. For comparatively assessed, the empirical data indicated that structural forces have significantly mediated the relationship between departmental heads and educational technology, with human agency located more in the position of adapting to, rather than actively shaping developments within all but a limited pedagogical aspect of the professional's work. The time dimension, embedded into the research design, moreover, enabled this change to be identified in terms of a clear retrogressive shift from a relatively agency-led situation in the 1980s to a structural dominant one by the end of the study's timeframe in 2016.

Political dimensions; overtly manifest as governmental influence in education, has been theorised (for differing reasons) as both complex and thus limited by some scholars (Hamilton & Feenberg 2005; Jensen & Lauritsen 2005) by means of being resisted, ignored or assimilation and aligned into existing procedures and processes by political elites or stakeholders (Ball, 1993). However, contrary to prior assumptions all senior and middle managers interviewed concurred that formalised state policy was internally prioritised and actioned, whether it was perceived as aiding or constricting the effective deployment of human and ICT resources.   A compliance which dominated

personal and professional judgement as conceptualised at Layder's self or individual psychobiography (1993, 2006).

Whilst a few managers viewed some state initiative (e.g. Blair's NGFL polices of the 1990s) favourably, most subsequent centralist, interventionist directives, enforced via external agencies, were assessed negatively, contrasting with the enabling support of LEA advisors in the 1980s. The latter were seen as constraining rather than facilitating educational technology development and contributing both to a standardisation of work patterns which were largely perceived as detrimental and conducive to accentuating recruitment problems and a sense of mistrust towards, and alienation from, government organs. The commonality of both perspectives was notably aligned in the agreed pre-dominance of government-led salient turning points (as discussed in Chapter 6).

As hypothesized, the evidence confirms Considine's (2005) assertion of the significance of unforeseen consequences, particularly where legislation was credited with unwittingly fostering internal inter-departmental divisions between ICT and academic staff and in hampering the emergence of a confidently, professionally trained, critically, ICT-literate, teaching and managerial staff. Hodas' argument of deliberate, power-seeking, organisational intent in undermining skills acquisition is reflected to some extent in evidence of senior management's constraint over professional development. However, it applies less at the *context* level where Blair's NOF training was perceived as well-intentioned but 'incompetently' applied at the level of organisational *setting*.

The interconnection of economic and political, mutually supporting interests was indicated in responses which highlighted the validity of Selwyn's (2002) 'educational technology' discourse theory, albeit in ambiguous terms. On the one hand, managers overtly recognized a primary economic motivation behind much state ICT educational policy, citing early support for the British computer industry as evidence. On the other hand several managers had, I suggest, assimilated a powerful and culturally entrenched 'discourse of globalisation' (restricting national influence and managing public expectations) interpreted in its threatening, rather than facilitating role. Several managers evidenced the harsh realities of employment challenges and public cost cutting as affecting their educational outlook. Indeed, the educational tenet (of Selwyn's tripartite rationale) utilizing 'reified' technology to improve education was more ambiguously expressed than hypothesized. Whilst as we have seen in the

classroom level of usage, technology was interpreted as a supplementary aid, in its more generalised conceptualisation, technology was expressed less critically, as a representation of positive modernisation and the 'march of progress', in language which reflected a sense of inevitable, forward momentum, resistance to which was both futile and reactionary.

Although a few managers cited examples of efficient and supportive commercial technology, on balance the assessment was of commercial forces as deflecting time and energy from educational tasks; fostering a perpetual dependence on physical structures and equipment which was often (despite high quality private sector rhetoric) functionally poor and inappropriately designed for educational purposes. Consultation in the design process was significant by its absence, with any control limited to self-creation projects and adaptations by participants. The commercialization of education was increasingly perceived as driving unnecessary change, as manifest in the continual updating processes over which managers expressed a lack of control and an uncertainly of direction, supporting the theories of Schiller (1995) and Dale (2009). Moreover, the resigned perception of the relegation of traditional 'public good' (co-operative) by private interest (selfish, competitive) values, as identified by Sussman (1997) and supported by an anti-teacher media (which often utilised ICT to berate the profession), engendered feelings of low morale and insecurity. Both political and economic influences are of course arguably interwoven with, and reflections of, the broader neoliberal ideology which has dominated western society since the 1980s and shaped not only the organisation of schools but its wider environment. It is this entrenched cultural climate which has encouraged stakeholders such as parents and senior mangers to demand, and professionals to comply (unions perceived as politically emasculated) with a technology sustained exponentially expanding work remit.

Thus amidst the highly complex relationship between middle managers and educational technology, two dominant trends have emerged from my study. Namely, a creative, adaptive and satisfying relationship with the technical when manifest though professional autonomous use on the one hand, whereby the human-technology relationship is seen in a positive mutually social shaping capacity and a linear, driving, stultifying and constraining manipulation of technology for the purpose of organizational control, on the other, reflecting the dominant neo-liberal cultural, political and economic ideology in which it is

embedded. Ironically, the latter development inhibits the very educational processes it professes to support. For, paraphrasing Jones (2014), without academic freedom digital teaching and learning cannot flourish.

Original contribution of the thesis

My thesis contributes to the body of multi-disciplinary literature on educational technology in three main ways. Firstly, by virtue of its methodological contribution in adapting and applying existing frameworks to a long demanded 'theoretically sophisticated and considered' (Selwyn 2008:82) analysis of the highly complex human-technology relationship in an educational environment. Whilst some academics have long critiqued the under-theorising of educational technology and particularly its dominance (in the discipline of education) by the powerful orthodox view of technological determinism, empirical studies seeking conceptualisation and operalisation from a more social shaping perspective have proved more illusive due to the theorising challenge which necessitates introducing 'elements of the social into explanations of the technical' (Rappert, 2003) without an imbalance towards either social determinism or soft determinism. Although one of the ranges of social shaping of technology theories (e.g. SCOT, SST, ANT) could have redressed the linear causal model of activity with a more complex multi-interactional one, I considered them (as discussed in Chapter 2) equally limited in scope. Consequently, in order to maximize their strengths in drawing attention to both the wider social, cultural, economic and political milieu and the interactional circumstances in which humans and technology interact, I adopted a general social shaping approach to a theorisation of the social world which facilities the operationalisation of my specific research investigation from a multi-dimensional perspective.

By flexibly applying Layer's model of the social world and its conceptualized of interconnected domains, I offer a valuable contribution to the understanding of the phenomenon from a previously unexamined holistic perspective. This is achieved through a comprehension of the complexity of the middle manger's experience with educational technology, demonstrating as Bijker (1987) posits, how any technological artefact or process is subject to a series of interactions, constructions and negotiations within the social. In addition, by

introducing the highly elusive concept of time, accessed by incorporating analysis across the manger's whole career, rather than concentrating on a single, static point in time, the dynamic of change is opened up and interwoven into investigation, enabling as Webster (2006) cautions, the phenomena to be viewed comparatively with opportunities to identify both elements of continuity and change. Consequently, the complexity and interrelationship of the head of department's engagement with technology can be more comprehensively explored.

Thus investigation, centred at an individual (*self*) and immediate interactional (*situated activity*) level with departmental colleagues and students, is continued at a (school-based) organisational (*setting*) level and encompassed within a wider macro *context* of social, political and economic developments which constrains and regulates both the institution and its workforce. The whole, being shaped within the intersecting element of historic time; a dimension of analysis notoriously difficult to accommodate in previous educational technology research. Layder's (2006) adapted model has consequently aided clarity by enabling the inter-connectedness of the separately (and artificially) identifiable elements that shape the interaction in the professional's working life over time to be viewed simultaneously.   Focus on the *self* domain was particularly valuable in enabling the individualised element of analysis to be viewed in a field which often underestimates and reduces their significance to generalized, collectivized group behaviour dynamics. It was evident throughout the interviews for example that the participant often clearly wished to voice a particular experience or viewpoint (poor training, firing, examination cheating, governmental policy etc.) that was uniquely formative in their (later) relationship with technology, emphasising the importance in research of both the unique perspective and the power of life experience.

The process of reassembling the artificially 'unpacked' theoretical social world for analytical purposes requires an interpretative weighting of elements to be afforded by the subjective researcher and it is from this perspective that an overall evaluation is offered. Within this remit consequently, the evidence suggests that the effective educationally-focused deployment of technology by the departmental head; one that is perceived on balance in terms of an aid to positive, creative and satisfying pedagogical change, is constrained at both the *self* and departmental and classroom *situated* levels by the restricting organisational

demands within the workplace (*situated activity,*) to the extent that the creative, adaptive and flexible deployment of the former is harmed by the controlling (via administrative task generation and surveillance) focus of the latter. While one could argue that the detrimental effect of unregulated technology in facilitating bureaucratic excess is an unwitting and unforeseen development of ICT (with the momentum of technological change constantly outpacing human capacity to cope), my research suggests otherwise. The evidential, social perspective, particularly the absence of senior managerial resistance, yet marked embrace of ICT administrative systems, expresses an increasing divergence between organisational and personal goals and evidences the emergent power differentials of two conflicting stakeholders. A feature illustrated in the differing purposes of applied technology such as databases and spreadsheets (selectively analytical to aid student learning or over-excessively surveillancing and directional to aid control and staff subservience).

Moreover, the data shows how its development over a period of time is interlinked to macro level economic and political elements, un-manifest during the more egalitarian consultative and consensual climate of secondary school management, experienced by older departmental heads during the 1970s. Indeed, the political and economic mutually self-supporting relationship of the 1980s (Thatcher government's support of British computer industry) and 1990s (Blair's Superhighways and globalisation initiatives) helped channel the affordance of existing technology, designed for the commercial and business market, into educational administrative and managerial, arena (Ball 2007). Thus linking the prioritization of managerial and administrative tasks over the educational at the meso level of analysis to the macro and entrenching and perpetuating the ICT-led commercialization of education.

While some elements of the political were more directly educationally intentioned and formative (e.g. National Grid for Learning), their implementation in situ at the organizational level, encouraged technology policy to be similarly unwittingly, or more deliberately shaped by meso elements and stakeholders (exemplified over time by IT departments, as seen in Chapter 6 to the vested interest of the ever expanding senior management sector) in a manner which fostered internal division in implementation.

The significance of the cultural dynamic which intersections all domains has, I believe, been hitherto underestimated.   For in Chapter 6 we have seen how

a dominant, anti-union, neoliberal ideology has permeated macro level political state direction to encourage the insertion of qualitatively 'alien' ('*American imported*') managerial systems of control in UK schools (and other public institutions). By virtue of the quantitative measuring processes '*necessitated*' and intensified by digital technology, the implementation of a more factory style (input-output), standardised mass industrialised processing of public educational system jars with the more independent professionalised, public-sector value system, so entrenched within the British educational tradition. Interviewees recalled favourably an era when the independent, uniquely individulaised teacher was valued and standarised procedures and processes belittled, as un-intellectual and demeaning to both staff and students. It is unsurprising therefore that the departmental head sees his/her status currently undermined, reduced to a '*cog in a wheel*', and standardisation-inducing processes which include the distortion of a former supportive departmental managerial role to one of underling, as regressive change and certainly not of continuity of process.

The culture elements of the self-orientated features of neo-liberalism as exercised in the broader socio-economic domain can also be see to infiltrate the demands of stakeholders such as parents and students, and through the realisation of technology, produce more detrimental working conditions for staff. Moreover, the evidence reveals a surprisingly distinct ambivalence in the relationship with the cultural embedded educationally technology discourse. While a more critical assessment is offered by most interviewees at the specific application level of technology, at a more general level of interpretation a distinct assimilation (of technological determinism) is evident, which permeates a more general attitude towards '*innovation*' and technology in highly positive terms; equated with progress, forward momentum, and modernization. Indeed the latter is viewed (whether for good or ill) in terms of inevitability or as irrational to critique and over which agency has little control (as seen in several articulations of an uncertain, fearful future) which I speculate has some origins, prior to the 1980s discourse, deep in the collective consciousness which springs from British industrial history.

Secondly, in terms of its empirical contribution by providing qualitative rich data in a field dominated by positivist, quantitative data in an hitherto neglected and un-interrogated research area. Consequently, this study adds depth to the level of debate by redressing the balance of research which is

predominantly psychological developmental and learning theory orientated, by emphasing the role of the hitherto under-researched secondary school middle manager in contrast to the student at the core of much previous investigation or the head teacher; the focus of much managerial and leadership study.   By providing qualitative insight into the working life of the professional, but often under-noticed departmental head, this thesis addresses shortfalls in both subject content and perspective on the phenomenon.   As articulated by its title, my investigation offers a 'missing' experiential perspective and workforce focus, which contributes to a deeper and more sophisticated understanding of the workings of educational technology in UK schools and the consequences for elements of its educational staff.

Finally, my thesis proposes some contribution to the development of general social theory concerning fundamental questions of how 'the encounters of everyday life and individual behaviour influence, and are influenced by the wider social environment' (Layder, 2006: 1).   For as Layder argues the development of general social theory in isolation from practical empirical research renders both 'impoverished'.   To facilitate an engagement in theoretical issues and specifically to enable an investigation of the agency-structure linkages and questions of the co-existence relationship between creativity and constraint, to which the exploration of the human-technology relationship, I believe lends itself, the study utilised Layder's 'adaptive theory' (1998) of four multiple social domains (as explained in Chapter 3).   With respect to issues of agency and structure, therefore, defining the former concept as individuals being able to do things which affect the social relationship in which they are embedded and structural as the social context of the institutions, structures, and cultural arrangements which moulds the former's social activity, this evidence suggests, albeit from the individual's perceptive, that the relationship, is less one of an equal *mutually* shaping influence between social activity and social context, but rather one in which there is both elements of *weighing* and *fluctuation* through time.   This element of comparative evaluation extends to issues of constraint and creativity, the co-existence of which is 'visible' when participants weigh its 'effects' by reference to the three distinct aspects of their role (teaching, administration and management) variously. Although both concepts co-exist simultaneously, the very nature of the interviewees' 'balanced' overall judgement (evident from an holistic reading of the interview data) suggests that they are not weighted equally

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and that there are clearly times when constraint is viewed as overriding creativity and vice–versus at various stages in the working life continuum.

Consequently, with regard to shedding some light on the structure-agency question, the more senior participants interviewed consensually regarded their early engagement with technology in the 1980s, not in terms of passivity or feelings of being under the constraint of social pressures and circumstances, but rather ones articulated through the enthusiastic language of creativity, design, leadership, formative, experimental and exploratory processes; with a sense of ability to shape to some extent their immediate physical and human organisational environment (the department and school). The contrast with experiences in the late 1990s (and multiple turning points are citied in Chapter 6) onwards is marked. Feelings of constraint, pressure and powerlessness to control the manner in which technology is employed (from educational to administrative and managerial functions and purposes) and the loss of choice in direction is pronounced with government and the school organization (and business and global forces to a lesser extent) perceived in terms of external, constraining rather than liberating 'structural forces' and the manager self–described as a more hapless *'minion'*, at the mercy of, rather than the mutual shaper of technological change.

Reflections on research limitations

The research group, while reflecting some diversity in age, gender and location was constituted more as the result of natural occurrence and opportunism than design. Middle managers were, for reasons previously cited, reluctant to be interviewed and any optimism in selecting from a wide choice of interviewees, based on specific characteristics was quickly dispelled. Consequently, I had to deploy flexible strategies, supplementing the mainstream access route via official institutional channels (due to reduced take up) by utlising online and personal (public examination board) networks. The former had the disadvantage of rendering a head teacher or other ICT-interested senior manager as gatekeeper and thus potentially pre-selecting, often, more flavourably-ICT inclined staff, for interview. The latter route naturally drew volunteers who were highly motivated by ICT developments, and often motivated to impart particular messages or narrate salient experiences (either negatively or positively) which may have skewed the data. Generalisability from the evidence is therefore limited.

However, this is an inherent feature of qualitative research (as outlined in my methodology) and was not my intention. This study is unique; a product of its time and specific circumstances, my aim being to employ subjective perspectives to add depth to an understanding of the complexity and interrelation of the phenomenon.

One further advantage, and disadvantage of undertaking an holistic, social shaping approach to this problem was to constantly draw attention to other socio-economic contextualizing aspects which would benefit from further exploration, *ad infinitum*. Where I did consider a greater understanding of middle manger perspectives on the phenomenon warranted supplementary key informant interviews (particularly from senior managers, head teachers and NQTs), I was limited by time resources to securing fewer than ideally wished and consequently some perspectives were omitted due to time pressure. Staff teaching PGCE (Post Graduate Certificate in Education) courses in colleges of Further and Higher Education, for example, would have proved insightful on the training of NQTs and media editors from the *Times Educational Supplement* would have been particularly informative regarding educational technology discourse formulation. With hindsight, in order to better accommodate such dimensions, I would have commenced fieldwork earlier.

Moreover, although allocating an initial twelve month period for interviews, due to the need to conduct them at times amenable to staff (e.g. start of academic term when fresh or end of vacation, post fatigue) this period stretched into twenty-four months with, data analysis and interviews occurring simultaneously (albeit fortuitously enhanced).

Although my role as key research instrument in the qualitative methodological approach has strengths in terms of my thirty-five years' wealth of knowledge and understanding of educational technology, it also presented clear challenges. My natural empathy and sympathy with interviewees as a teacher and departmental head, despite attempts at reflexivity, will undoubtedly have influenced my interpretations. In a social shaping approach which emphasises the political and historical, my personal experiences of multiple schools and the political and economic climate in which my own career is situated will influence my interpretation of data and understanding, albeit through natural comparative verification. However, without this unique understanding and the independent research status which I was able to bring to the study (which was ascertained by

most interviews before they were willing to embark on any discussion) and which engendered trust and elicited disclosure of information, the evidence presented in the thesis would not have been accessible.   Most interviewees would certainly not have come forward and participated unless I was able to genuinely demonstrate that the research in question mattered as much to me as it did to them. Moreover, all interviewees expressed a keen interest in the study's analysis and final conclusions, requesting a summary of the findings and thus reinforcing the importance of conducting research which is fundamentally communicable to its participants.

Finally, although the holistic approach of the research design was effective in drawing together mico, meso and macro level analytical findings to highlight their essential interconnectivity (and Layder's level of *setting* was particularly helpful in separating department and subcultures from general organizational culture and work place relationships) they are artificial impositions. Thus, as with all modeling of the social world, its findings are tentative and consequently limited.

Recommendations for further research

Although I have attempted to approach the study holistically, the subject area of educational technology is by definition extensive.   My focus on middle managers, while incorporating multiple perspectives (some NQTs, SMTs, trade union) has primarily focused on a single group (departmental heads) within secondary schools, largely in London and Southern England. Consequently, broadening individual perspectives, geographical locations and institutions (primary and colleges) would prove fruitful, as indeed would comparative studies undertaken, particularly in Nordic countries which are upheld as 'reformist' exemplars.

Often UK based research and commentary is inclusive of both primary and secondary school teachers. As Jones (2010) cautions attributing common characteristics to, in actuality, highly diverse cohorts (albeit students or teachers) are based on artificial constructs. However, as Mulchay's (2015) study shows (and my practitioner experience confirms) I would argue that there is a clear distinction between secondary and primary school culture, organizational structure and teacher practices, pedagogical requirements and preferences (open

plan versus closed space teaching preferences as illustrated). Thus, further empirical research into ICT influences within the latter organizations, utilising an holistic, social shaping approach, would serve to shed light on the way in which educational technology has interacted with highly complex and diverse institutional structures, patterns and practices; focusing on whether ICT deployment, in its school organizational capacity, emerges in a similar or contrary, non emancipatory, non-democratising manner as these research findings suggest.

Moreover, further critical empirical research is needed to develop and extend the issues and themes generated by this study and the new questions raised which are beyond my current resources to supply.

Firstly, pertaining to questions posed around the nature of '*resistance*'. Particularly why structures and individual teachers and managers fail to oppose or alternatively do resist educational systems which they believe to be harmful to both their personal wellbeing and the values of the wider organization to which they subscribe and how these are exhibited in daily life (issues tangentially raised via path dependency theory in Chapter 5) and at what personal and educational cost. While, for example, there was considerable agreement regarding the detrimental aspects of technology-enhanced administrative and managerial systems of control (from both middle and some senior managers), most interviewees when asked why their unions, or from their positional power as middle managers, failed to redress these problems, argued that resistance was futile; perceiving the existing obstacles to be insurmountable and immutable.

While some academics have called upon teachers to resist developments (Selwyn & Facer 2013) which run counter to ICT use in education as a means of personal and social emancipation and indeed to employ traditional formats such as trades unions and political parties (Jones 2014) this study evidences resistance problematically. For to voice *public criticism* or to openly display critical reflection was widely perceived as 'dangerous' to one's employment security, albeit in an institution ostensibly subscribing to the educational values of critical thinking and instilling the virtues of independent thought, initiative and creativity in its students and expecting it from parents.   Whilst acknowledging the socializing influence of staff acquiescence towards the long embedded hierarchical systems which ensure whole school discipline and thus functionality (as previously noted) certainly, the organ traditionally viewed as channeling more

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protective, collectivized criticism, the trade union, was universally seen as ineffective; its political power reduced to a social functions role. One American head teacher expressed surprise that British unions would 'put up' with so much in comparison with her experience of American unions impacting via 'protest' and 'fighting for change.' Thus, an investigation into the nature of criticism, both at the individual level and within the cultural context of its legitimate expression, relating issues of self-regulating behaviour self-regulation to more recent study in staff digital monitoring and surveillance (Lawson, Harrison & Cavendish 2004; Ball 2009) would prove enlightening. While an explanation of the profession's *trade-unionism ineffectiveness* and how this relates to institutional technological developments and/or wider societal and political power based shifts pertaining to global capitalism, labour instensification, computerized automation and its accompanying subordination and passivity (Kupchik & Monahan 2006), is overdue for rigorous empirical study.

A major, pivotal personnel change within the organisation seems to be the stage at which the middle manager is promoted to senior management and how that positional power is employed, usually to place collectively perceived 'whole school' interests and values above those of the individual workforce from which they have emerged. As my research concludes this 'interest' which prioritises rationalizing institutional 2005 or a limited, bureaucratic vision of academic success (Pring 2010; Blackler 2005) over the educational individual is actually counterproductive in terms of 'real' academic quality achieved, and recognized as such by many participants. Yet, whilst some senior managers were amenable to answering questions pertaining to this issue, the majority deflected or preferred to decline responses, expressing the subject as too sensitive (or guilt laden). Consequently, empirical research into the acquiescence of line and performative-management systems; regimes epitomizing conflict and struggle rather than consensus and trust (Gleeson and Knight 2006), when it stands in such stark contrast to staff traditional values would be valuable.

What role the obvious, ICT enhanced, centralising, top down (work flow imposition) model of management (Apple 2010) plays in personal human self-interested decision making at this stage is worthy of investigation, as suggested by one professor of management studies interviewed as an expert informant (citing the proliferation in Business Management and Educational Masters degrees) and by one participant in this study who chose to 'escape' the subservient classroom

monitoring via senior management promotion because of its demeaning impact. Certainly most participants in my research agreed with Grieshaber (2010) that online staff collegiality was 'contrived' and any genuine mode of active, two-way engagement 'false'. A view reinforced by Fuery's (2009) observation of unequal surveillance and connectivity practices (Apple 2010) at work in schools with classroom teachers being rendered more visible than managers and administrators.

That managerialism may also negatively affect the quality of senior management (criticisms repeatedly articulated by NQTs and middle-managers in this study) recruitment is highlighted by Gleeson & Knight's (2007) research. The scepticism of middle managers in a study of English further education colleges for, and rejection of, the culture of managerialism and its audit and accountability responsibilities, in preference for more subject 'autonomy', pedagogical values, family commitments and work-life balance, (institutional protection versus civic responsibility) lead to non-participation in the traditional career paths into senior management with detrimental consequences for the quality (expertise, altruism, professionalism)of whole school leadership. Thus further in-depth interviews with *senior managers* at this stage in their career, would offer insight into their motivation, the effect such ICT developments have on their relationship with other professionals in the organisations and how they address such value conflict.

Secondly, regarding themes emerging from the study of the key mentoring relationship between departmental heads and their younger staff and NQTs entering, and more significantly, leaving the profession. Although a discourse has implied that the challenges to technological implementation in schools would be solved once older staff retired and were replaced by new digital natives, events have circumvented theory. With a forecast retirement age of sixty-eight years (and potentially upwards) and evidence which indicates young staff are either leaving the profession far earlier than anticipated or not being recruited into it at all, the current organisation will constitute a varied and mixed aged personnel, which is set to persist for the foreseeable future. Although this study noted elements of changing cultural and value systems regarding how some young staff saw teaching as only a temporary job (one to acquire transferable skills) not a long term profession, these observations were tangential to the main group investigated and were viewed in terms of their relationship with departmental heads rather than explored in their own right. Consequently, the unanticipated

demographic mix offers opportunities for further study around the early experiences of NQTs, and what attracts and detracts young people from the profession or how different age-related value systems (as previously identified) affect internal relationships. Additionally, of particular interest was the discourse disseminated by teaching training colleges, as indicated by the research participants, reflecting a biased and unrealistic assessment of their elder (and their own) colleagues ICT competency and the NQT's 'modernizing' mission, which would render further investigation into the latter's programmes of study and the inter-institutional relationship informative and enlightening.

Finally, and interlinked with all the above is the need for further critical exploration of the key theme which has emerged by virtue of this study's holistic perspective, that of the imbalance in the deployment of technology between its academic or instructional focus and what Griffith and Andre-Bechley (2008) identify as its 'institutional' functions (rationalized procedures regulating everyday institutional operations). As emphasized throughout my study my aim of approaching the subject holistically is to redress the overconcentration of research on ICT and learning with the consequence that developments in the more dominant institutional side of educational technologies has escaped the critical scholarly attention warranted. Theories pertaining to the development of ICT and excessive bureaucracy and administration, identifying a range of relationships from technology deterministic and interactive (Moon & Bretschneider 2002) to more social contextual (Zack & McKenny 1995) have been considerably augmented by new focus on the manner in which institutional technologies have been configured to support what Apple (2010) refers to as 'conservative modernization' of schooling via a data-driven audit culture. As my research shows participants were cognizant of the intensification of management control of the curricula and standarised 'labour' processes, utilising integrated management information (MIS) and learning management systems (VLEs) via an audit culture which demanded the continual and 'time and energy' wasting production of digital evidence (via this converged Learning Platform) that staff were performing both efficiently and in the prescribed (correct) manner. Consequently, questions concerning the continuity (rather than innovation) of neoliberal organisational power augmentation via integrated technology (Nordkvelle & Tosterud 2008;) and the implications of the extension of 'dataveillance systems from pupils to staff (Daniel, 2008) require further invesitigation. The latter involving the

transference of private data into publically accessible (SMT, parents, students) 'profiles' (via Learning platforms) rendered staff in this research certainly vulnerable to a visibility and accountability which they felt to be used in a negative, 'coercive' and 'controlling' manner. Concerns that professional knowledge and expertise was being superseded by aggregated data on pupils (as raised by one head of English preferring to ascertain knowledge by through face to face contact with students rather than accessing a digital pupil database), confirms Daniel's (2008) theory that such systems dehumanise and deprofessionalise relations in schools. Thus the contribution of ICT systems to discredit personal experience and professional judgement as articulated by participatants, thereby contributing to feelings of disempowerment and de-professionalism, requires rigorous investigation.

Implications for policy

Despite continued academic debate over the relative strength of governmental influence, all participants in this study recognized its power (for good or ill) to engender responses within the organisation itself; macro-level policy being clearly interlinked (if mutated) with meso-level action. Whilst recent trends have seen governments worldwide ostensibly voicing support for increased teacher autonomy, by shifting national curricula from the highly prescriptive format (of England's 1988 National Curriculum), their actions in fostering regulation through output via inspections, accountability mechanisms, and external attainment data has continued to erode such autonomy. Similar claims to granting greater independence through 'self' governing schools in England (exemplified by 'academies') have exacerbated the problem, particularly where they are employing 'Americanised, business models'. As this study has shown governmental policy implementation 'on the ground' is subject to multiple influences and unforeseen developments, irrespective of questionable intent.

However, as evidenced, it is the internal organisation's technology-facilitated management systems and performative cultures, which by enforcing scrutiny and low levels of professional trust, are stifling professional effectiveness and creative use of technology and distracting staff from the for the core educational (teaching and learning) purpose. Thus the constraints exhibited in the new ICT public delivery systems are 'in direct contradiction of the expressed

rationale of market reform to more flexibly meet client need (Gleeson & Knight 2006:66) It would be overly optimistic given its recent historical record and the cultural and political climate, to assume that profession bodies such as trade unions were positioned to engender some amelioration or that senior management is sufficiently enlightened to change its ways. Consequently, it is within the macro political sphere that redress is recommended. Given the functional (skilled work force) prioritisation of educational policy, the current crisis in teacher recruitment and retention and consequently the widely heralded evaluation of 'poor' educational attainment (unsurprising when calculating processes continue to supplant the educational activity they are deemed to be measuring), the government has a vested (and legal responsibility) interest in actioning reform. Moreover, the need to redirect governmental agency towards counter balancing the distorting use of technology-enhancing bureaucracy and redundant management levels in secondary schools is pressing. Any national intent towards re-establishing professional autonomy (as opposed to organizational) and thus raising the status and morale of the profession is to be encouraged. For as the evidence confirms personal self-management is the essence of professionalism and individualized, autonomous use of ICT is the key its effective use educationally.

A three-fold approach to practical formulation is recommended based on the publication of clear national government guidelines, followed by the commissioning of further research in the area (leading to educational directives or legislation as appropriate) and instructions to the existing educational inspectorate to deter further development along the lines critiqued.   The Scottish educational establishment has already given a tentative lead in this field, showing the manner in which it could be developed.   A 'Tackling Bureaucracy' report, for example, was published in 2014, followed by the commissioning of research with a clear 'message' from the Chair's *Task Group on Assessment and Testing* (Dr Alasdair Allan, Minister for Learning, Science and Scotland's Languages) that the promotion of teaching and learning "must not be obscured by bureaucracy and unnecessary paperwork. That is unacceptable and needs to stop now." The UK's political machinery for reform can be similarly activated under traditional parliamentary procedures. This would entail investigation by the English Parliament's Education Committee (including a focus on constraints posed by the commercialisation of ICT infrastructure), engendering a (non legislative)

recommendation report and a governmental Command paper response. The wider circulation of both publications would have the added advantage of alerting and stimulating valuable debate within the international educational research community as proffered in my introduction.

Although an English educational directive mitigating superfluous processes and procedures, as appropriate is to be welcomed. As in Scotland, the existing school's inspection system (Ofsted) can in the first instance be more quickly and effectively employed via published instructions to inspectors to challenge and discourage overly bureaucratic systems, linking both directly to managerial inspection criteria. Thus, existing criteria for inspection would need to be broadened, from its prioritisation on student evaluation to encompassing definitions of whole school 'excellence' which incorporated major assessment of supportive management structures, minimal bureaucratic monitoring systems and professional work load and staff welfare dimensions. Thus the requirement for schools to pass 'Ofsteds' and progress in League Tables would be re-deployed in a manner which enhanced, rather than hampered the performance and status of the staff which mediate effective education.

Concluding remarks

> 'I really like being a head of department. It's not difficult to feel
> empowered because it's a wonderful job. It's a real privilege that people
> let you be with their children for five hours every day. You see them in
> the transformative period of their lives. You're sharing ideas with them
> and making them think about new things. That's incredibly special and
> not something you can take lightly. It is a rare and wonderful experience
> and it makes it worth it all'.

In a society where genuine altruism is elusive, the participants interviewed have proved uniformly impressive by virtue of their commitment to the promotion of educational values in an often unsupportive environment. As the quotation from a head of English demonstrates, their unfailingly positive attitudes, expressions of satisfaction and enjoyment in in the face of an unsustainable work load and their unselfish care for the welfare of others is remarkable. Several, would not hesitate to recommend the profession to their own children and other young graduates despite the challenges identified throughout my research.

This study, matters, not only in terms of its contribution to a better understanding of the way in which we think about, and action current educational

technology, but how through a more holistic, critical and comprehensive examination of the processes of human-technological interaction we might be better able to employ this knowledge in the improvement of the working lives of our teaching professionals and thus secure the quality of education of future generations of students. For having identified the problem, explored its manifold dimensions, this research points to those bodies responsible and the actions capable of addressing them; concluding that this is a challenge with a realisable solution. Contrary to the designer Ove Arup's observation (Tonks 2012) technology, (in this study's interpretation), never needs to outstrip man's ability to control it.   The answer does not require excessive expenditure from scarce national economic resources, but more the exercising of rational political will.

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Appendix 1: Digital Technologies

Computer based systems, artefacts & devices referenced by participants in the research under ICT and educational technology.

Computing hardware systems & devices	Desktop PCs (Personal Computers) e.g. BBC micro model B, Acorn Archimedes, Commodore PET, Apple Laptop computers Tablet computers iPads Interactive whiteboards Simulation systems Immersive environments
Personal computing devices	Mobile phones 'Smart' phones mp3 players
Audio-visual devices	Digital radio, television, video
Content free software packages and applications	Word processors Databases Spreadsheets Powerpoint
Content related computer software packages	Simulation packages Tutorial Packages Computer Assisted Learning (CAL)
Worldwide web content, services and applications	Web-pages & web services Search engines e.g. Google On-line tools – 'e-tailing, social networking, content sharing applications Social media & ' Web 2.0'– applications for communities of users authoring & sharing of content e.g. Wikipedia Virtual Learning Environment (VLEs) e.g. Moodle Third generation 'cloud computing' tools
Other Internet applications	Email 'voice over internet protocol' e.g. Skype other web-based telephone services e.g. video conferencing
Infrastructure Communications	Intranet & Internet Providers & servers Broadband connections & fibre optic Wi-Fi Mobile broadband

Appendix 2: Research Participants

1. Names. All names are pseudonyms. Each participant is identified by a unique Christian name and referenced in the main body of the thesis with an accompanying code reflecting experiential level (via subscript) e.g. Anne$_{a;}$.

2. Codes. Participants are grouped into five categories (coded a-e) based on level of professional experience as follows:

  a. *Senior manager* - **Head teacher, deputy head, director, assistant principal with prior head of department experience (academic &/or pastoral).**

  b. *Experienced middle manager* - **Head of department (academic/pastoral) with over twenty-five year's teaching and managing experience.**

  c. *Mid career middle manager* - **Head of department (academic/pastoral) with twelve year's plus teaching and managing experience.**

  d. *Early career middle manager* - **Head of department (academic/pastoral) with under eight year's teaching and managing experience.**

  e. *Key informants* - **trades union official, chief examiner, government ICT advisor, newly qualified teacher & management & technology academic.**

Category Code Audio Transcript Ref	Name	Gender & Estd Age	Organisational experience	Current professional role
Senior Manager (a) A/30021	Tom	Male 30s	London Independent Mixed	Director of Digital Learning Head of Design & Technology
Senior Manager (a) A/30044	Steve	Male 50s	State Bath, Bristol, London Independent Girls	Head of IT Director of Information Technology
Senior Manager (a) A/30052	Nick	Male 50s	State UK wide	Head teacher Deputy Head Vice Principal Head of History Faculty Head

Senior Manger (a) A/30054	Justin	Male 40s	State & Independent UK wide	Assistant Principal Pastoral head Humanities teacher
Senior Manger (a) B/30013	Janet	Female 40s	State and Independent Girls London	Head teacher Head of Languages
Senior Manger (a) E/30025	Andrew	Male 50s	State Independent London	Deputy Head Head of Physics
Senior Manger (a) E/30060	Dominic	Male 50s	Independent State school Experience	Deputy Head Head of Geography
Experienced Manager (b) A/30047	James	Male 50s	Independent UK wide	Head of Mathematics
Experienced Manager (b) A/30048	Mia	Female 50s	State UK wide	Head of IT
Experienced Manager (b) B/30015	Michael	Male 50s	State Independent Girls	Head of Mathematics
Experienced Manager (b) B/30018	Daniel	Male 50s	State UK wide	Head of mathematics & IT co-ordinator & Senior teacher
Experienced Manager (b) B/30032	Oliver	Male 50s	State UK wide	Head of Mathematics & Head of IT
Experienced Manager (b) B/30033	Owen	Male 50s	UK Wide State Independent	Head of Religious Studies & Humanities & ICT
Experienced Manager (b) B/30035	Isabella	Female 50s	State UK wide	Head of Humanities & Teacher Trainer
Experienced Manager (b) B/30042	Chris	Male 50s	State UK wide	Head of Information Technology & IT co-ordinator

Experienced Manager (b) C/30023	Evelyn	50s	State UK wide	Head of English & (SEN)
Experienced Manager (b) D/30010	Female Ella	Female 50s	State UK	Head of History & 6th Form & Public examiner
Experienced Manager (b) D/30026	Charles	Male 50s	State UK	Head of IT & ICT trainer
Experienced Manager (b) D/30028	Grace	Female 50s	State UK	IT teacher & Head of Chemistry
Experienced Manager (b) D/30029	Victoria	Female 50s	State UK	Teacher of French, Italian, IT & Head of Year
Experienced Manager (b) D/30040	Aaron	Male 50s	State Independent UK wide	Head of Technology & ICT trainer
Experienced Manager (b) E/30049	Robert	Male 60s	State UK wide	Head of Humanities
Experienced Manager (b) E/30058	Evan	Male 50s	State Academy London	Head of Art
Experienced Manager (b) A/30034	Graham	Male 60s	Mixed Comprehensive Across UK	Head of IT & public examiner
Experienced Manager (b) B/30038	Liam	Male 50s	State Grammar UK wide	Head of Physics & Science
Mid Career Manager (c) A/30012	Emily	Female 40s	London Independent Girls School	Head of Biology
Mid Career Manager (c) A/30045	Abigail	Female 40s	City Independent Girls London Australia	Head of Geography & E-learning co-ordinator for twelve years

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Mid Career Manager (c) E/3001	Etham	Male 40s	Mixed State Academy	Head of History & Public examiner
Mid Career Manager (c) A/30046	Caroline	Female 40s	Mixed State	Head of Media Studies
Mid Career Manager (c) D/30051	Matthew	Male 40s	State UK	ICT teacher & Teacher trainer
Mid Career Manager (c) E/3007	Jack	Male 40s	London Academy	Head of Psychology
Mid Career Manager (c) E/30057	Ian	Male 40s	State Independent London UK wide	Head of Science Head of ICT Company IT consultant
Mid Career Manager (c) E/30056	Henry	Male 40s	State	Head of History
Mid Career Manger (c) A/30017	Female Roberta	30s PGCE recent	London Mixed Academy	Head of Year 12& 13 Teacher of English, Politics, Geography
Mid Career Manger (c) D/30020	Female Hilary	30s	State UK wide USA	Head of Music Head of Year 9
Early Career Manger (d) A/30024	Susanne	Female 30s	London Mixed	Head of English
Early Career Manger (d) D/30050	Female Jane	20s PGCE	State UK	Newly Qualified Teacher of Humanities
Early Career Manger (d) A/30053	Male Mike	30s PGCE/ training recent	3 training schools in UK	Ex NQT Head of Technology
Early Career Manger (d) B/30036	Colin	Male 30s	State Academy	Head of Technology & Science teacher

Early Career Manger (d) C/30019	Micha	Female 30s	State Academy	Head of English
Early Career Manger (d) A/30014	Anna	Female 20s & recent PGCE	London Independent Girls School	Head of German
Key Informant (e) A/30022	Ria	Female 20s	Four schools experience in London, including teaching practice	Newly Qualified Teacher & recent PGCE experience
Key Informant (e) A/30041	Edward	Male 50s	University London	Management & Technology Academic: Professor in Oganisational Studies
Key Informant (e) B/30034	Philip	Male 60s	State UK wide	Government ICT advisor: National ICT programmes & BECTA, Head of Mathematics
Key Informant (e) D/30030	Carl	Male 50s	State Independent UK wide	Chief Examiner For A Level History & Head of History
Key Informant (e) E/30065	Richard	Male 40s	State UK wide	Trades Union Official: NUT secretary London & Head of department

Appendix 3: Research Instrument

Flexible interview guide for departmental heads and key informants.

Topic	Prompts
General technological change over career	What can you remember from your early career about technology and its introduction? What technology could you not live without?
Attitudes to technology *Head & deputies*	Have your attitudes to technology changed in the light of your experiences? *Have you noticed any difference in the staff between attitudes towards ICT?* *Have you noticed any conflict between your ICT staff and your Heads of department?*
PGCE training aspects *NQTs*	Was there any justification for the use of ICT in your PGCE course? *How effective was your ICT training in the light of real workplace experience?* *What are your support structures?*
Technology and teaching experience	Is there good software available for Your subject area? Do you think technology has changed the way in the way you teach your subject? Have you noticed any behavioural differences in the way in which your students are dealing with technology (critical faculty/devices used)?
Departmental staff behaviour, attitudes and relationships	How do you think your staff cope with the amount/pace of change and new material with which they have to deal? Have you noticed any change in working relationships due to technology? Have you noticed any differences in subject/pastoral uses and attitudes?
Technology and administration and management	What is the role of a head of department today? What are your challenges and satisfactions? Have you found technology to help/hinder you in any of your administrative or managerial tasks as a head of department? (workload, time, energy)? How do you keep abreast of

	developments in departmental capacity? What is your relationship like with companies & organisations from which you purchase hardware/infrastructure & software? What are the challenges of your job? How important is ICT in those priorities?
Communication	How has technology influenced communications with other members of your department? What format do meetings take? Do your staff use technology for continuing professional development? Hass technology influenced your relationship with parents?

Working conditions	Can you just describe for me a typical day? How long is your working day? Are you accessible in the evening? Who protects your welfare? Have you got any trade union or welfare supporting agencies/organisations in your workplace?
Role changes	Has technology affected the teaching-administration, management-ratio? Have there been any new developments in the nature of your job over time? How do you perceive your status and the teaching profession?
Senior Management relationship	Have you noticed any organisational changes over your career (structure, internal relationship)? How do senior managers employ technology?
Continuity and change	What are your views on the type of change encountered in your lifetime (revolutionary change, continuity)? To what extent has your role and work changed? To what do you attribute change/continuity?

Agency and structure	Has technology empowered/helped you (creativity) with work? Has technology constrained/hindered you or your colleagues in any way? What other factors influence your relationship with work (exam boards, government policy etc.)? How much attention do you have to pay to government policy?
Unforeseen consequences	Is there anything that has surprised you about technology? Anything that you were unprepared for or view as unforeseen? What should I have asked you and didn't?

Appendix 4: Information and Consent Form

Queen Mary
University of London

Research on Information Communication Technology and Education

Information for participants

Research title: 'The Missing Link': A critical perspective on the role of Heads of Department in relation to Information Communications Technology and UK Secondary Schools.

I would like to invite you to participate in this research project, which forms part of a PhD thesis which I am undertaking at Queen Mary, University of London. Your participation is entirely voluntary and should you decline this invitation, you will receive no further contact form myself or the university.

Please read the following information carefully before making a decision. This will tell you why the research is being undertaken and what you will be asked to do if you take part. Please ask if further information or clarification is needed to inform your decision.

If you decide to participate you will be asked to sign the attached form to say that you agree. You are still free, however, to withdraw at any time and without giving a reason.

The Research: The aims of the research are to explore how educational technology (since its introduction in the 1980s) has influenced the professional work of Heads of Department and teachers in UK Secondary Schools, including working practices and institutional structures.

Taking part: This will involve an (usually audio recorded) interview of approximately one hour, which will take place at a location and time convenient to yourself. The interview will cover such issues as your experiences with information technology use over your professional career.

Confidentiality and anonymity: All data collected for this project will be anonymised. All reports and publications emanating from this study will be presented in a manner which ensures that no comments can be linked back to specific individuals and all personal information will be concealed. If you choose to withdraw from the study, any information already obtained will not be used. This research is in compliance with the ethical review procedures of Queen Mary, University of London.

If you have any questions or concerns about the manner in which the study was conducted please, in the first instance, contact the researcher responsible for the study:

Katrina Barker, School of Business and Management, Queen Mary, University of London, Mile End Road, London, E1 4NS. k.s.barker@qmul.ac.uk

If this is unsuccessful, or not appropriate, please contact the Secretary at the Queen Mary Ethics of Research Committee, Room W117, Queen's Building, Mile End Campus, Mile End Road, London or research-ethics@qmul.ac.uk.

Queen Mary
University of London

Consent form

Please complete this form after you have read the Information Sheet and/or listened to an explanation about the research.

'The Missing Link': A critical perspective on the role of Heads of Department in relation to Information Communications Technology and UK Secondary Schools.

Queen Mary Ethics of Research Committee Ref: _____

- Thank you for considering taking part in this research. The person organising the research must explain the project to you before you agree to take part.

- If you have any questions arising from the Information Sheet or explanation already given to you, please ask the researcher before you decide whether to join in. You will be given a copy of this Consent Form to keep and refer to at any time.

- I understand that if I decide at any other time during the research that I no longer wish to participate in this project, I can notify the researchers involved and be withdrawn from it immediately.

- I consent to the processing of my personal information for the purposes of this research study. I understand that such information will be treated as strictly confidential and handled in accordance with the provisions of the Data Protection Act 1998.

Participant's Statement:

I _____ agree that the research project named above has been explained to me to my satisfaction and I agree to take part in the study. I have read both the notes written above and the Information Sheet about the project, and understand what the research study involves.

Signed: Date:

Investigator's Statement:

I, Katrina Barker, confirm that I have carefully explained the nature, demands and any foreseeable risks (where applicable) of the proposed research to the volunteer.

Signed: *K. S. Barker*   Date:

Appendix 5: Request letter individualized to Secondary School Head Teachers and Heads of Department.

Doctoral Research participation request

Dear…,   Date…

I would like to invite Heads of Department (academic and pastoral)/or you (for Heads of Department) at ……..School to participate in a doctoral research study which forms part of a PhD thesis being undertaken at Queen Mary, University of London.

The investigation explores the experiences of UK Heads of Department with digital technology, spanning a period from 1979 to the present day. The aim is to provide Middle Managers, as a vital component of curriculum delivery, but a hitherto neglected research group, to express their perceptions and experiences concerning the introduction and development of educational technology during their professional career, via in-depth personal interviews.

Participation would involve the Head of Department in an one hour audio recorded interview with myself in a venue of their choice (e.g. quiet office, coffee house, library, or via Skype).

The research complies with the ethical review procedures of Queen Mary and consequently strictly adheres to the highest standards regarding anonymity, informed consent, confidentiality and non-traceability, to both participants and the institutions involved.

A summary of the research findings will be made available to your institution should you wish on completion of the thesis.

Thank you in advance for your valuable contribution to furthering academic knowledge and understanding in this crucial area of educational research.

For further details and clarification and/or to arrange an interview please contact:

Katrina Barker. BA, P.G.C.E. MSc.
School of Business and Management,
Queen Mary, University of London,
Mile End Road, London, E1 4NS
k.s.barker@qmul.ac.uk

Yours sincerely,

Appendix 6: Email request for specialised organisations.

e.g. Miranda Net
mirandalink@mirandanet.ac.uk

PhD research teacher interview request:

I am currently researching the 'effects' of educational technology on the professional working lives of teachers in UK schools (1979-2015), via qualitative in-depth interviews as part of my doctoral thesis at Queen Mary University, London. I would be grateful if any UK secondary school teachers, heads of department and head teachers would consider participating in this research or can forward the request to individuals who may be interested in this area. Participation would involve expressing your experiences and perceptions in an hour's interview (in person within the London area or via Skype or phone), from your perspective as a teacher; newly qualified, currently practising or retired. Such insights would prove invaluable in providing a depth of understanding to a subject which is, all too often, narrowly focused and lacking the dimension of change over time. If interested please reply directly to me, rather than the MirandaLink list. A more formal letter explaining the details will follow on request. All data collected will be anonymised and this research is in full compliance with the ethical review procedures of Queen Mary, University of London.

Sincerely,

Katrina Barker
k.s.barker@qmul.ac.uk
Skype: KSBResearch

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